APRIL • 1954

# NLGI Spokesman

Journal of National Lubricating Grease Institute

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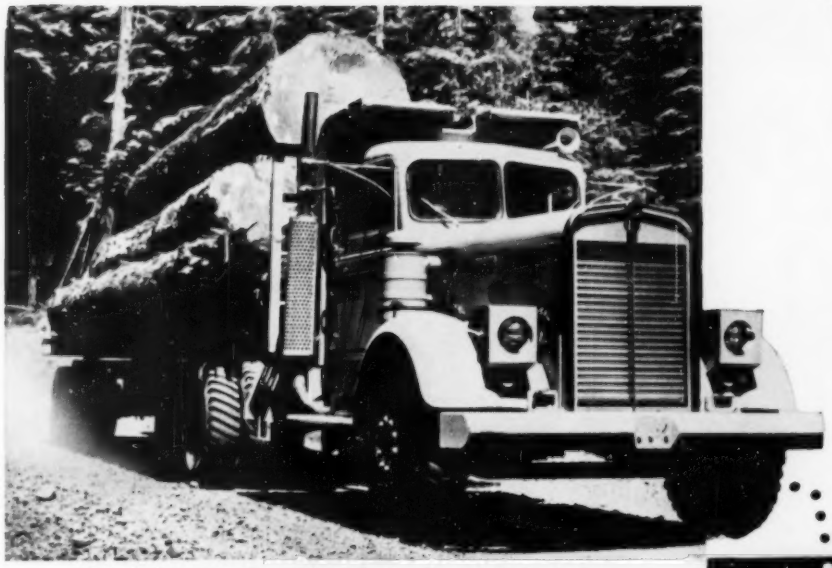

*The Timberman*, an International Lumber Journal, Portland, Ore.

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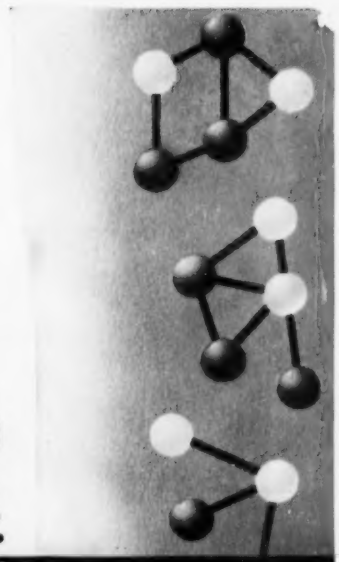

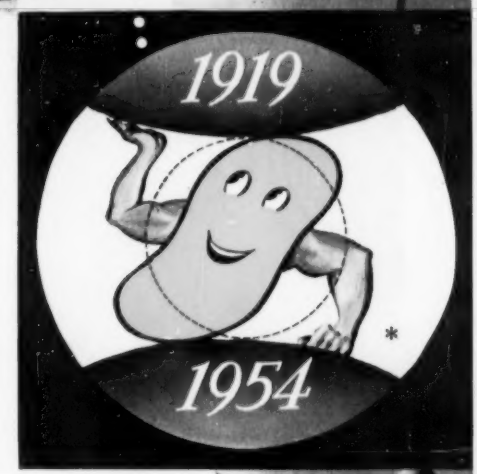


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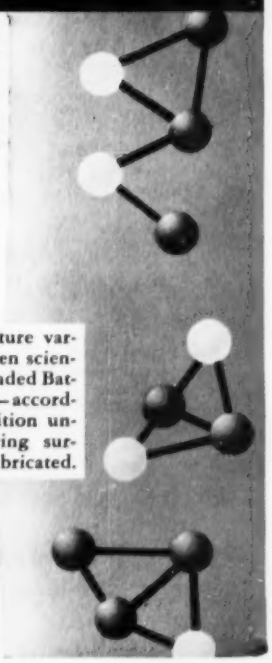

Molecular structure varies widely between scientifically compounded Battenfeld greases—according to the condition under which bearing surfaces must be lubricated.

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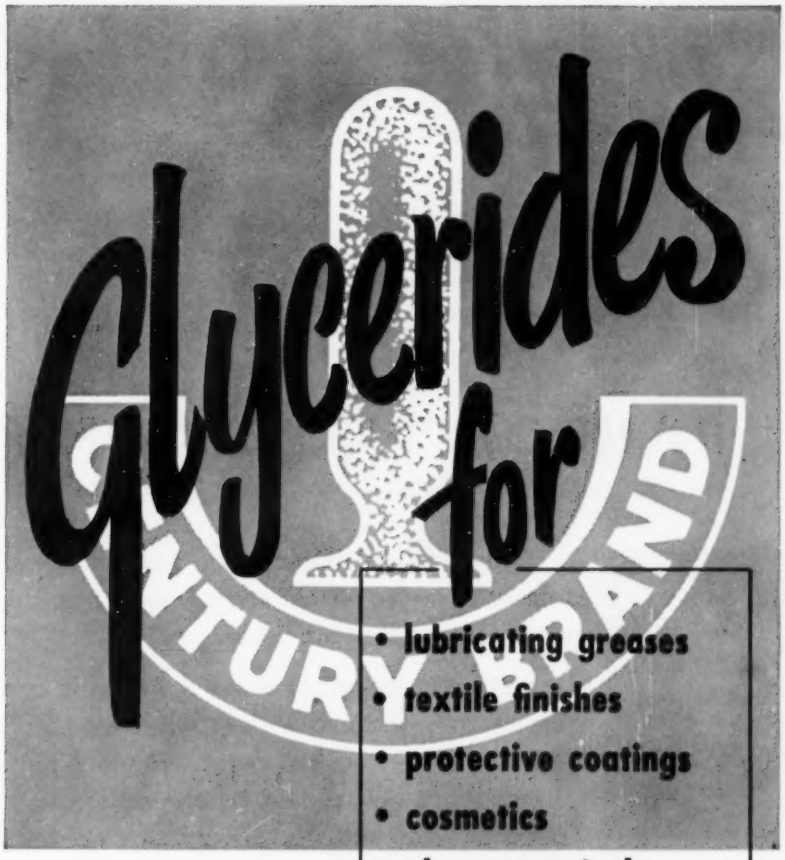


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| | |
|---|---|
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| Acid Number | 4.0 |
| Saponification Number | 176-184 |
| Iodine Value (WIJS) | 1-5 |
| Melting Point (°C) | 82-85 |
| Hydroxyl Value | 155-165 |
| Acetyl Value | 137-148 |

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**SPECIFICATIONS**

| | |
|---|---|
| Titre | (136.4-140.0°F) 58-60.0°C |
| Iodine Value (WIJS) | 1-3 |
| Free Fatty Acid | 1-3% |
| Acid Number | 2-6 |
| Saponification Value | 190-195 |
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# President's page

by G. A. OLSEN, President, N L G I

## RANDOM PHILOSOPHIES

Robert Burns expressed a thought for each of us when he said, "Would some power the Giftie gie us to see ourselves as others see us."

But confusion might result if we could see ourselves as we are, because we are what we are; we cannot be truly other than ourselves. We reach perfection, not by copying—much less by aiming at originality—but by constantly and steadily working out the life, which is common to all, according to our individual talents.

The secret of real happiness is not only doing what one likes but enjoying what one has to do.

Difficulties sometimes prove to be blessings in disguise and show what people are. We usually learn more from our failures than from our successes—defeat is nothing but education.

A man achieves according to his goal in life, and one requisite for success is to do more than you are required to do.

Strange as it may seem, success comes to those who are too busy to look for it.

Those who desire friends do not indulge in faultfinding. Don't judge a man by his clothes. God made one and the tailor made the other.

Of all the things you wear, your expression is the most important.

Sir James M. Barrie wrote, "The life of every man is a diary in which he means to write one story and writes another, and his humblest hour is when he compares the volume as it is with what he hoped to make it."

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## ABOUT THE COVER

This month you will read about substituted ureas as grease thickeners. Most of the work done in developing technical material in this article was under contract between Wright Air Development Center and Standard Oil Company (Indiana). This seemed to call for a cover illustration of a jet plane.

Here you see our artist's conception of a jet F-100 which the authors tell us may be more effective by using a type of lubricating grease described in the article as being developed for certain high temperature bearings in aircraft.

We thought it made an effective picture; so did our artist, and here it is.

# Substituted

**Jet planes like this F-100 may be more effective by using arylurea-silicone grease that out performs any previous grease in certain high temperature bearings in aircraft.**


## Abstract*

*For numerous applications greases are needed that will give long service over a widening temperature range. Because the range for most fluids is too narrow and because inorganic thickeners interfere with high speed bearings, greases made with organic thickeners in silicone fluid offer the most promise.*

*Arylureas were found to have the desired properties. Greases compounded with arylureas and silicone are noncorrosive, high melting, and thermally and chemically stable. They have good rheological properties over a wide temperature range. In laboratory tests, several have repeatedly performed for over 500 hours in ball bearings operating at 450° F and 10,000 rpm.*


Long service is being demanded of lubricating greases over widening temperature ranges. In industry, high temperatures are encountered in kiln-car and oven-conveyor bearings, motor bearings on rolling mills, and equipment used with quenching baths. Lubrication engineers resort to a multiplicity of lubricants, frequent lubrication, and standby parts in case of failure. These expedients are impractical for military purposes, where temperature problems are especially severe and failure may be disastrous. In military aircraft, high temperatures result from the use of jet engines, higher speeds, and size reduction of accessory equipment; extreme cold is encountered at high altitude and in arctic operations[1].

Greases may fail to meet expectations for wide-temperature use because of deficiencies in the fluid or thickener, or the incompatability of these components. The fluid must have a wide liquid range and low volatility at high temperature. Petroleum and fluorocarbons have too narrow a liquid range, diesters are liquid over a wide range but are too volatile at high temperatures, and silicate esters are subject to hydrolysis. One type of silicone, methylphenylpolysiloxanes, despite poor lubricity, appears to be the best fluid for the purpose[2].

Even in silicone fluid, few thickeners are satisfactory for use at 450°F[3]. Soaps are satisfactory for high speed but have low melting points. Inorganic thickeners are not suitable for high-speed use, and those rendered organophilic by organic coatings are unstable above 300°F. Of organic materials that approach the desired properties, copper phthalocyanine perhaps has the widest utility, but even it did not give entirely satisfactory service in high-speed ball bearings at 450°F.

Because of the high melting point and thermal stability required, only a few classes of organic compounds need be considered. Substituted ureas appear to have the desired properties. A variety of these compounds can be made by varying the groups attached to the urea linkage (>N-CO-N<); examples are given in Table I. Arylureas are higher melting and more stable than alkylureas; many melt above 600°F.

*Most of this work described here was done under contract between Wright Air Development Center and Standard Oil Company (Indiana).

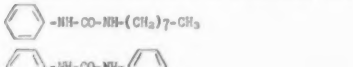
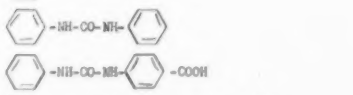
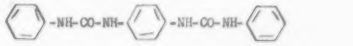
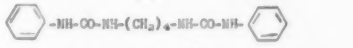
# Ureas as Grease Thickeners

E. A. Swakon
C. G. Brannen
L. C. Brunstrum

Standard Oil Company
(Indiana)

**TABLE I**

**Types of Substituted Ureas**

| *Class* | |
|---|---|
| Alkylmonourea | $CH_3-(CH_2)_7-NH-CO-NH-(CH_2)_7-CH_3$ |
| Alkyldiurea | $CH_3-(CH_2)_7-NH-CO-NH-(CH_2)_4-NH-CO-NH-(CH_2)_7-CH_3$ |
| Alkylarylmonourea |  |
| Arylmonourea |  |
| Aryldiurea |  |
| Alkylaryldiurea |  |
| Polyurea unit | $-\left[-CO-NH-(CH_2)_4-NH-\right]_n-$ |

Perhaps the simplest method for making urea compounds is to react an amine with an isocyanate:

$$RNH_2 + R'\text{-}NCO \rightarrow R\text{-}NH\text{-}CO\text{-}NH\text{-}R'$$

Other methods start with an acid azide or carbamyl chloride:

$$RNH_2 + R'CON_3 \rightarrow R\text{-}NH\text{-}CO\text{-}NH\text{-}R' + N_2$$
$$RNH_2 + R'\text{-}NHCOCl \rightarrow R\text{-}NH\text{-}CO\text{-}NH\text{-}R' + HCl$$

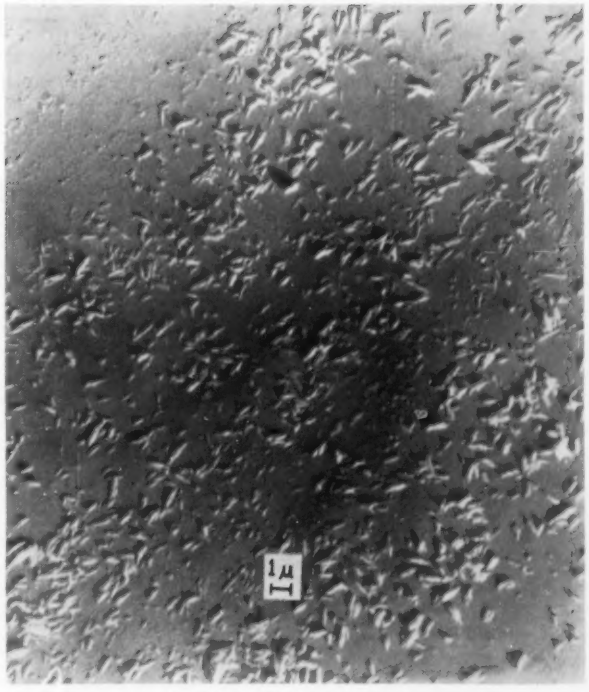


**Figure 1—Electron photomicrograph of an arylurea-silicone grease.**

Acid azides and carbamyl chlorides are not as readily available as isocyanates. Substituted ureas can also be made by heating a mixture of mono-substituted urea and amine.

More than fifty greases have been made with urea thickeners and silicone fluid. The physical properties of these greases have been compared by numerous laboratory tests and their performance has been studied in torque, wear, and bearing testers.

### Properties of Arylurea-Silicone Greases

Arylurea-silicone greases are bright, smooth, opaque pastes. An NLGI No. 1 grade is obtained with 10 to 30% of thickener. Consistency depends upon the urea compound and its particle size; smaller particles give heavier greases. The electron miscroscope shows that the particles in the grease are rod-shaped and about 0.1 micron wide and one micron long. Figure 1 is an electron photomicrograph of one such grease.

Mechanical stability was determined with the mechanized ASTM grease worker and the Shell Rolling Stability Apparatus[4]. Two greases worked 60 strokes and 100,000 strokes in the ASTM worker show only small changes in ASTM penetration:

| *Unworked* | *After 60 strokes* | *After 100,000 strokes* |
|---|---|---|
| 307 | 310 | 332 |
| 348 | 353 | 343 |

The small change is Shell penetration after four hours in the Shell apparatus also demonstrates high mechanical stability:

| *Initial* | *Final* |
|---|---|
| 139 | 163 |
| 188 | 180 |

Leakage and evaporation data were obtained by the conventional cone-and-beaker method[5]. Figure 2 compares the characteristics of an arylurea grease at 450°F. with lithium soap-silicone grease at 400°F. The arylurea grease had lower leakage and evaporation than the soap greases even at a higher temperature.

Rust inhibition of arylurea greases was determined by the freewater corrosion test[6]. The greases did not provide adequate protection against rusting or black staining, but did show good inhibitor response.

The tendency of arylurea grease to corrode copper was studied in two tests. In the government-specification test involving a mechanically polished strip[7], only a light stain was usually observed on the portion of the strip above the arylurea grease. In the ASTM test involving a chemically cleaned copper strip, no stain was observed. Arylurea greases do not appear to attack copper.

Thermal stability was studied by bomb tests, dropping-point tests, and oven tests. Several greases showed pressure drops of less than one pound in the ASTM bomb test after 500 hours at 212°F. These greases were heated to 600°F without melting or separating in the ASTM dropping-point apparatus. The oven test consisted of heating the grease at 450°F for several days, passing it through a three-roll mill each day after a cooling period, and measuring micropenetration[8]. The consistency data are:

| Days | 1 | 2 | 3 | 4 | 5 | 8 |
|---|---|---|---|---|---|---|
| Micropenetration (77°F) | 124 | 128 | 143 | 173 | 169 | 150 |

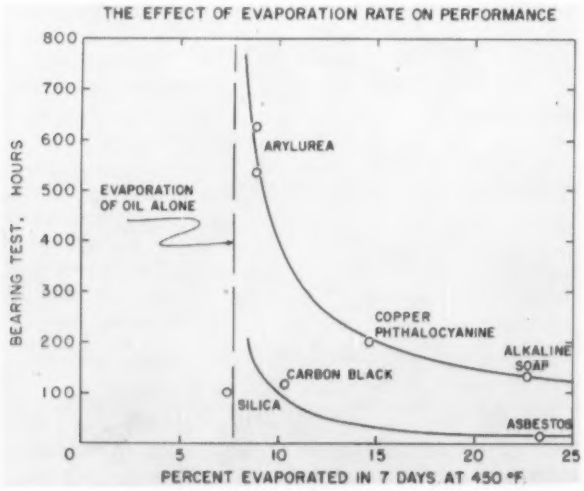
The change in consistency is less than that of one NLGI grade.

In submerged evaporation tests, arylureas were compared with other thickeners to determine their effect on the volatility of the fluid. Greases were covered with four times their weight of silicone fluid and heated at 450°F, and the weight was measured daily. Figure 3 shows the loss of silicone from five greases and from the control sample, silicone fluid, over a period of a week. The samples containing soap, asbestos, and copper phthalocyanine had high evaporation losses and those containing arylurea and silica were about the same as the loss from silicone fluid alone. The high losses are probably caused by catalytic degradation of the fluid[9]. This experiment shows that arylurea has little adverse effect on the fluid.

### Performance Tests

Because the performance of a grease depends upon its collective properties, performance tests are considered more significant than tests aimed at individual properties.

Pictured is C. G. Brannen following laboratory production of ASU grease.




This shows the effect of evaporation rate on performance.

Arylurea greases were compared with other greases by means of the low-temperature torque tester, Navy Gear Wear Tester, ABEC-NLGI Bearing Tester, and the Navy-Industry motor-generator set.

The torque tester[10] indicates the low-temperature limits of a grease. Tests were made at −40°F with a torque of 2000 gram-centimeters.. The time to make one revolution was 13.5 seconds for an arylurea grease and 19.5 seconds for a lithium-soap grease.

In the Navy Gear Wear Tests [11], the metal combinations were stainless steel on two compositions of brass. The results on greases made with silicone fluid and with di(2-ethylhexyl)-sebacate thickened with arylurea are compared in Table II with those on soap greases made with the same fluids. From a wear standpoint, arylureas are equivalent to soap in either fluid. The lubricity of silicone greases seems to be sensitive to differences in the composition of the brass.

### Gear-Wear Tests

**TABLE II**

| | *Average Loss in mg/1000 cycles* | | | |
|---|---|---|---|---|
| | *Brass A* | | *Brass B* | |
| *Grease* | *5-lb. load* | *10-lb. load* | *5-lb. load* | *10-lb. load* |
| Arylurea-silicone | 5.9 | .. | 1.4 | 2.2 |
| Arylurea-diester | 0.6 | 1.7 | 0.8 | 1.5 |
| Lithium soap-silicone | 7.1 | .. | .. | .. |
| Lithium soap-diester | 0.6 | 1.5 | 0.5 | 1.2 |

Brass A: 62.7% copper, 33.7% zinc, 3.6% lead.
Brass B: 59.0% copper, 40.1% zinc, 0.9% tin.

Bearing-performance tests were obtained with the ABEC-NLGI Bearing Tester[1], shown in Figure 4, operating at 450°F and 10,000 rpm. Nine tests on two arylurea greases all ran more than 500 hours. In contrast, greases made with inorganic thickeners failed in the first 100 hours. Those made with other organic thickeners gave intermediate results. The residue in the bearing after completion of the test was usually tacky or rubbery.

A single test made on the Navy-Industry motor-generator[13] at 325°F ran 4575 hours before failure. The residue in the bearing after the test consisted of black rubbery particles. Lithium-soap greases have been reported to run no longer than this at 300°F[13].

### Discussion

The laboratory tests demonstrate the utility of arylurea-silicone greases. Most of the individual properties, such

FIGURE 2

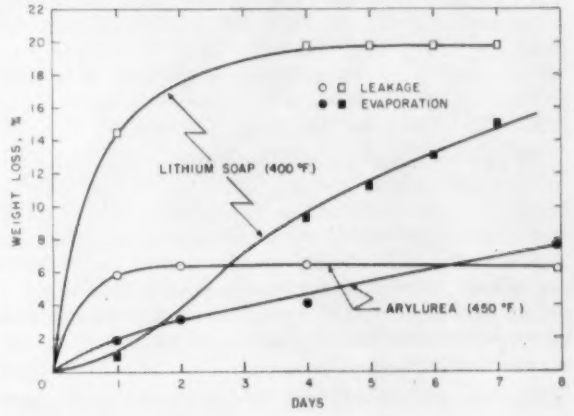
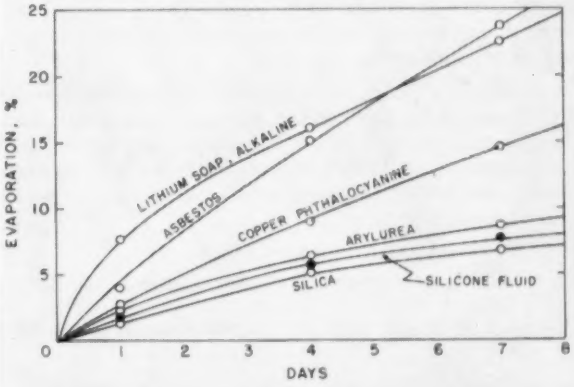
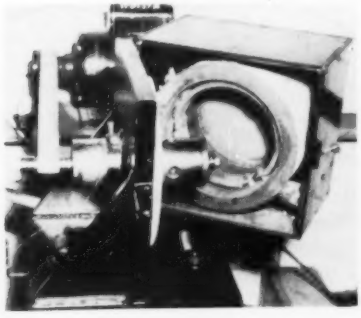



FIGURE 3



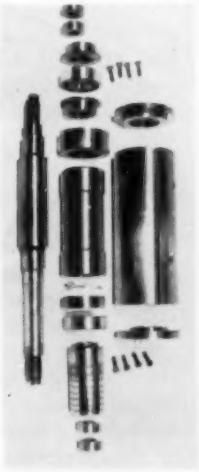
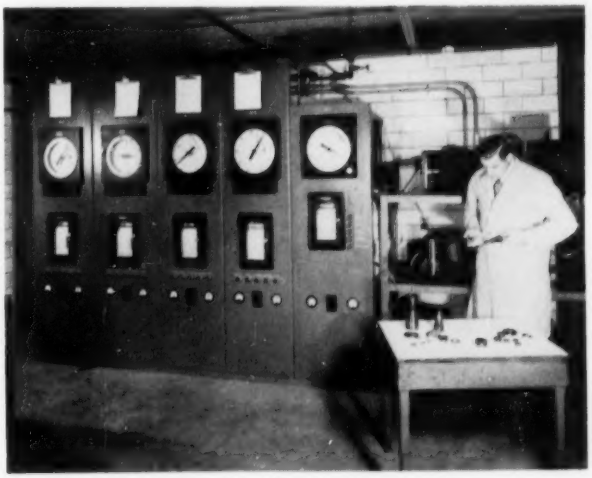


**Figure 4—Above is assembled spindle with oven open. In middle is ABEC-NLGI Bearing Tester, spindle detail. At right is Bearing Testers and Control Instruments. Edward Swakon is examining a test bearing after failure.**



as mechanical stability or rust inhibition, resemble those of common soap-petroleum greases. In two important respects—evaporation and thixotropy at high temperature—arylurea greases surpass other silicone greases. In performance tests other than gear wear, they are exceptional.

Arylurea greases, which are coming to be known as ASU greases, are truly long-service lubricants over a wide temperature range. They will function satisfactorily from sub-zero to 450° or 500°F. The relubrication interval is estimated to be one month at 450°F to six months at 325°F. Service tests now in progress are expected to define these limits for specific applications.

Because arylureas do not contribute to degradation of silicone fluids, these greases exhibit the normal relation between evaporation and performance[14, 15]. The excessive evaporation caused by other organic thickeners, as shown in the submerged evaporation tests, overshadows this normal relation and results in poor performance, as shown in Figure 5. The inorganic thickeners adversely affect performance directly, as well as accelerate degradation of the fluid.

Arylurea greases with different properties can be made by using other fluids. Greases have been made from petroleum oils, diesters, fluorocarbons, and phosphate and silicate esters. Although they are all high melting, none has the wide temperature range of the silicone grease because of the limitations of each fluid. On the other hand, several may be more satisfactory for applications involving sliding friction at high load.

To obtain a grease for higher temperatures and wider use, better fluids are needed. With a more stable fluid, bearing tests of still longer duration might be obtained with arylurea thickeners. If high stability could be combined with better lubricity, a truly multipurpose grease would result.

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**E. A. Swakon, C. G. Brannen and L. C. Brunstrum are discussing a bar graph comparing the bearing performance of various silicone greases.**

## DISCUSSION


***Presented by***

**C. C. CURRIE *and* W. H. RAGBORG**

***Dow Corning Corporation***


It is indeed a pleasure to offer the comments of Mr. Currie and myself on the paper just presented.

I would first of all like to compliment the authors on this important contribution to the grease field. We, at Dow Corning, have long felt the need for grease thickeners with better heat stability. This is especially true where high speed bearing applications are concerned.

Since I have no criticisms or contradictions to point out in this paper, my remarks will be restricted to emphasizing the present and future possibilities of the authors' discoveries. The improved performance of these urea-filled greases results only from the better stability of the thickener. Because these materials are organic, they do not appear to interfere with the operation of high speed bearings. The presence of the various urea compounds in polymethylphenylsiloxane fluid does not seem to improve either the heat stability or the lubricity of the base fluid. It is however, import-

ant to remember that the effect of these compounds was not detrimental in comparison to the other thickeners studied. The A.S.U. lubricants may offer an increase in the upper temperature limit by 50° to 100°F of high speed ball bearing greases. It is our feeling that the need for evaluation of these greases through performance testing cannot be overemphasized.

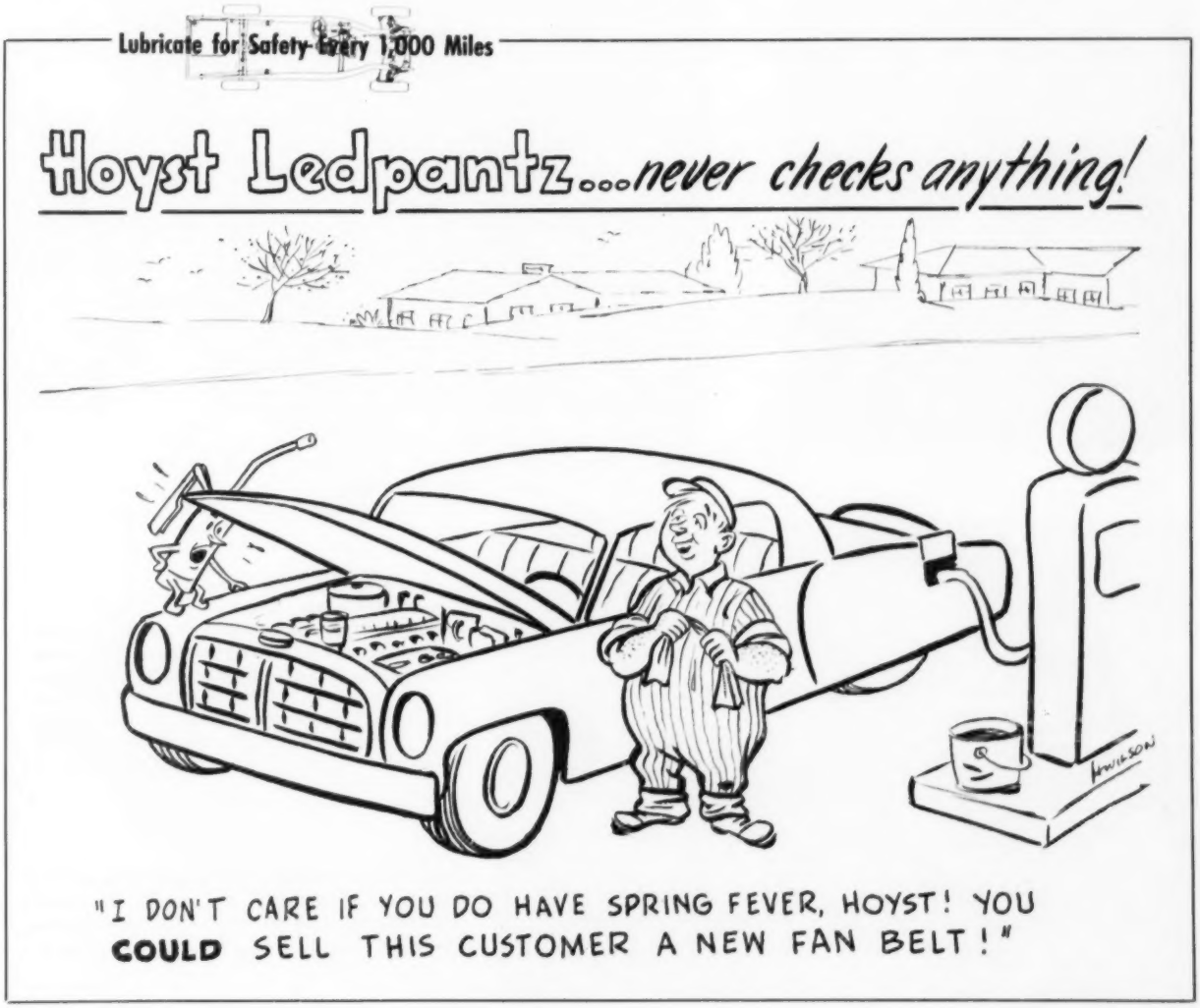
Present silicone fluids will operate successfully up to the range of 450° to 500°F, but the urea fillers offer the possibility of even better high temperature stability. This leads to the need for fluids with better heat resistance. In the silicone field the use of inhibitors or of entirely new fluids may be an answer to this problem. For use over a wide temperature span we now have a modification of one of our standard fluids which should be useful in the range of -65° to 450°F. It is our hope in the future to offer a fluid with lubricity comparable to organic lubricating oils. This may be accomplished with additives or again entirely new fluids. The discovery of new heat stable fillers such as aryl substituted ureas adds new impetus to the search for improved fluid lubricants.

# TECHNICAL COMMITTEE

***Chairman* T. G. ROEHNER,**
***Director of the Technical Service Department***
***Socony-Vacuum Laboratories***

Questionnaires have been sent to all members of the NLGI Technical Committee to obtain guidance regarding organization of the next Annual Meeting in San Francisco. The majority of the replies favor continuance of the type of agenda used in the previous two Annual Meetings. Individual replies differ primarily in respect to procedural details. In other words, there is considerable support for a division of the meeting into two sessions—the first to provide for Subcommittee reports and the second to be assigned to a symposium or panel discussion.

Regarding the subject for the next symposium, a strong majority of the replies selected "The Structure of Lubricating Greases." Accordingly, a Subcommittee will be organized to line up key speakers and to take care of the many other details involved in such a program.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# NLGI Board

On January 11, the NLGI Board of Directors held its usual meeting in Detroit, Michigan. The next morning, four Directors and the NLGI Executive Secretary answered an invitation from Ole Berg, Jr., President of British American Oil Company, Ltd., to visit their lubricating grease plant in Toronto, Canada.

**A warm reception on a chilly air field. Left to right, C. L. Johnson, W. M. Murray, A. J. Daniel, Harry F. Bennetts, Ole Berg, Jr. (host to the group) G. A. Olsen, President of NLGI.**

**Here they are at the start of their tour through the new B-A lubricating grease plant. In the center is B.A. President, Ole Berg, Jr. Others are members of his staff who escorted the group.**

**At upper left is what they saw when they entered the new British American building. Elevators took them to top floor where they were luncheon guests of Mr. Berg. All marveled at the modernistic building and unusual art work they saw everywhere.**

**At the left is a laboratory full of gadgets you read about in the SPOKESMAN but don't see too often. NLGI Executive Secretary looks as though he can't believe his eyes.**

# Makes Tour

A picture story of their reception and what they saw that day appear in sequence on these two pages.

After looking at the pictures, you will agree with the NLGI Directors that the plant is the most modern any of them had ever seen. If the equipment itself was sensational, so was the appearance of the plant. Not a spot to be seen anywhere.

**Adjoining the laboratory, is this pilot plant where all lubricating greases are "proved" in small batches before quantity manufacture starts. Note the shiny cleanliness of walls, floor and equipment. British American folks assured entire party plant hadn't been painted the day before, but is always kept this way.**

**Party stops on a second floor catwalk and looks upon an array of gleaming white storage tanks and maze of equally white pipe. Plant is three stories high with an annual manufacturing capacity of 15 million pounds of all types of lubricating greases.**

**Shown at upper right is the heart of the entire "push button" plant—the automatic control over all phases of manufacturing. The immaculate condition prevailing throughout the entire premises is due to this type of manufacture. Sparkling cleanliness everywhere won complete admiration from all NLGI Directors.**

**Last stop as pictured at the right, was the three-conveyor line filling stations where automatic equipment fills 25, 10 and 5 pound pails and 100-pound drums at rate of 60,000 pounds daily.**

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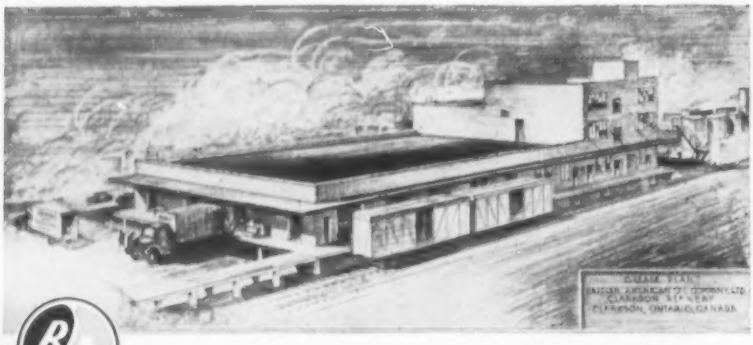

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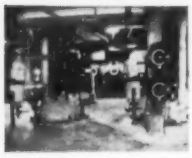
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# Patents and Developments

### Greases by Aqueous Slurry Saponification

One patent issued to L. Sonneborn Sons, Inc. (U. S. 2,659,695) points out that many difficulties have arisen in the manufacture of greases in which saponification is accomplished by use of aqueous slurries of an insoluble metal hydroxide at elevated temperatures. The main handicap is the considerable quantity of water encountered, which is difficult to remove and necessitates prolonged cooking, etc. In the case of water-proof greases, the retained water may affect the water resistance of the product.

This difficulty is claimed to be overcome by intimately contacting the mineral oil solution of fats or fatty acids with an insoluble metal hydroxide that is dispersed throughout a water-in-oil emulsion containing a petroleum mahogany sulfonate, which preferably is of the same metal as the insoluble metal hydroxide. The carrier oil preferably should be the same mineral oil as is used in the grease, and should not exceed 47 secs. Saybolt at 210°F and 310 secs. at 100°F.

The amount of mahogany sulfonate used should be controlled so that the amount in the emulsion is about 3-6%. The amount of water present in the emulsion should be about 30-60%, and the amount of carrier oil present should be about 17-25%. The following two examples show the differences involved in comparing the former technique with that covered by the patent:

**EXAMPLE 1**

A mixture of 210 pounds of tallow fatty acids, 20 pounds of hydrofol fatty acids (hydrogenated fish oil containing 52.6% stearic acid, 42.6 palmitic acid, 3.7% myristic acid, 0.8% oleic and .3% lauric acid), and 43 gallons of mineral oil were first charged into a steam-jacketed kettle and the temperature raised to 150°F. to melt the fatty acids. Then a lime slurry obtained by stirring together 60 pounds of hydrated lime and 11 gallons of water was run in while agitating the whole mixture. Though the lime slurry was strained prior to adding it to the fatty material, lumping of the mixture was observed. As the saponification proceeded a great quantity of water separated from the batch, amounting to 65% of the water added. Sampling of the grease in half hour intervals showed that maximum saponification was obtained after four hours, but it required two additional hours to cook out the separated water.

After six hours of cooking the balance of the mineral oil (43 gallons) was stirred in. Straining of the finished grease was necessary in order to free it from lumps. The finished grease had a mucky and slimy appearance and also had an inferior consistency and water-resistance.

**EXAMPLE 2**

A similar grease was made, using the same amount of fatty material, mineral oil, lime and water as in Example 1, except that the lime was added in a water-in-oil emulsion.

The latter was made by stirring the lime into an oil solution of calcium petroleum sulfonate and then adding to the lime paste, the same amount of water as in Example 1. 29 pounds of a 30% solution of calcium petroleum sulfonates in oil were used to prepare the lime emulsion.

Though the saponification was started with the steam completely shut off, the mixture was observed to quickly form a smooth, homogeneous paste. There was no lumping of the mixture and no water separation whatever. Sampling of the batch at definite intervals of time showed that saponification was more complete and proceeded at much faster rate at the same temperature than in the case of Example 1.

### Bentonite-Thickened Greases

A considerable saving in the bentonite-organic base compound can be effected, according to the Gulf Research & Development Company patent 2,662,056, when producing a composition of a selected consistency from an organic bentonite compound and an oil, if a small amount of water is dispersed together with the bentonite compound in the oil. It is noted that a dispersion of a small amount of water and a selected amount of bentonite-organic base compound in an oil produces a lubricant having a consistency greater than that of a lubricant containing the dispersion of the bentonite compound only in the oil. As little as 0.5% by weight of water dispersed in the oil can reduce by as much as 33% the amount of bentonite compound required when no water is present. The amount of water actually used may vary between 0.1-1.0% of the total composition.

The preferred bentonite compounds are those disclosed in U. S. Patent 2,033,856. A small amount of diaryl amine is added to improve oxygen stability. Use of dimethyldicetyl ammonium bentonite is specifically claimed.

U. S. Patent 2,662,057, issued to the same company, covers the use of diaryl amine for improving the oxidation stability of bentonite compound-thickened greases. Phenolic compounds are claimed to be unsatisfactory. Some of the suitable inhibitors include diphenylamine, phenyl alpha naphthylamine, alpha, alpha, alpha, beta, beta, beta dinaphthylamines, etc.

### Petroleum Lubricating Jellies

Thixotropic petroleum lubricating jellies having high dropping points, low running torques, and low oil separation characteristics are claimed to be produced in the Gulf Research & Development Company patent 2,662,058. It points out that in certain types of lubrication (as in fine instruments and intricate mechanisms) there are encountered conditions under which neither greases nor liquid oils are entirely satisfactory lubricants. It is desirable that the lubricant be of such consistency that it will remain between the working surfaces and not be lost by dripping or leakage. Liquid oil is not suitable because it will leak, while most greases are too viscous.

For this use, they recommend petroleum jellies having thixotropic properties acquired by using mixtures of lubricating oils with waxes having melting points above about 120°F, and generally together with a soap. It was found that when a bentonite-organic base compound is incorporated in thixotropic mixtures of wax and oil in an amount such that the ratio of the bentonite compound to wax is less than 1:1, compositions result which retain their thixotropic properties as well as show considerably higher dropping points, lower oil separation characteris-

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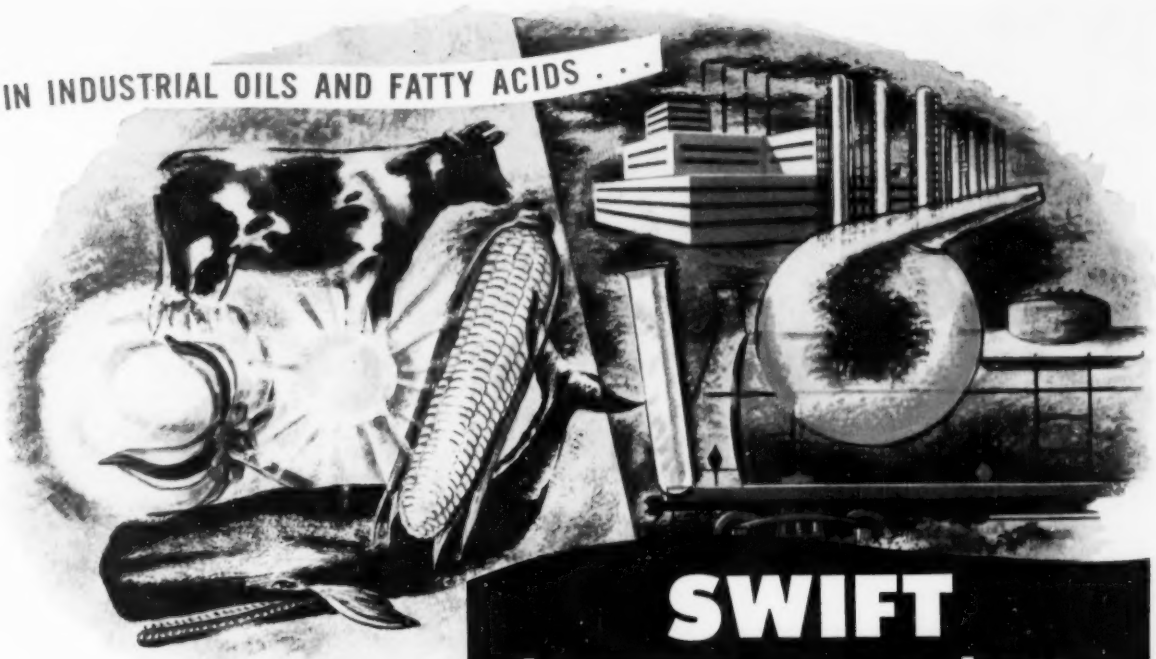

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tics than similar soap-containing compositions, etc.

It is preferred to use a wax having an ASTM melting point of about 160°F, such as ceresin wax from ozokerite. Generally, it is not necessary to use over 28% of wax. The oil used may be the conventional lubricating oil, preferably of over 90 viscosity index. About 70-90% of oil is used. As to the bentonite compound, 2-10% is the preferred amount. This compound is always used in amounts such that its ratio to wax in the finished jelly is not over 1:1.

**Ester-Bentonite Greases**

Compositions having the consistency of a grease and having good mechanical and lubricating properties can be prepared by dispersing a small amount of a bentonite compound in an ester of a dibasic acid. According to U. S. Patent 2,662,059, issued to Gulf Research & Development Company, preferred esters for this purpose are those having viscosities of about 45-400 SUS at 100°F, such as esters of oxalic, malonic, succinic, glutaric, adipic, phthalic and similar acids. Ester content generally is about 70-95% of the whole composition.

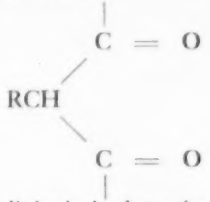
Table I shows data on varying the amount of bentonite compound in the di-2-ethylhexyl ester of sebacic acid.

**TABLE I**

| *Lubricating composition, parts by weight* | | *Consistency (ASTM D217-44T)* | |
|---|---|---|---|
| *Di-2-ethylhexyl sebacate* | *Dimethyldicetyl ammonium bentonite* | *Unworked* | *Worked* |
| 92.5 | 7.5 | 450 | 450 |
| 90.0 | 10.0 | 335 | 355 |
| 87.5 | 12.5 | 255 | 280 |
| 85.0 | 15.0 | 215 | 230 |

**Polyamide-Thickened Gels**

It has been found that the addition of as little as 1-2% of polyamide to lubricating oil can produce a gel suitable for use as a grease. In U. S. Patent 2,662,068, General Mills, Inc. discloses that these gelling agents are described in a previous patent (2,461,495) and they include resinous polyamides having a unit length of at least 8, in which the diacyl group has the formula:



in which R is an aliphatic hydrocarbon substituent containing 6-16 carbon atoms, and containing a polyamino group of the formula:

in which X is a divalent organic radical which separates the amino groups by a chain of at least 3 atoms in length.

In general, the polyamides have molecular weights in the range of 2000-2500. A polyamide from cetylmalonic ester and 1,3-diamino propane formed a grease in SAE 40 lubricating oil, upon addition of 2% by weight of the polyamide.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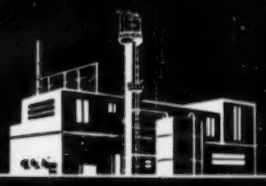

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*Author and Subject Indexes.*

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C. *Physical Properties.* 4. Crystal Properties. 5. Spectral Properties. 6. Thermal Properties. 7. Solubility and Solution Properties. 8. Properties in the Liquid State.

D. *Chemical Reactions.* 9. Salts of Fatty Acids. 10. Esterification and Interesterification. 11. Alkylation and Alkoxylation. 12. Pyrolysis. 13. Halogenation. 14. Hydrogenation and Hydrogenolysis. 15. Oxidation and Hydroxylation. 16. Oxidation by Atmospheric Oxygen (Autoxidation). 17. Biological Oxidation. 18. Nitrogen Derivatives of Aliphatic Acids. 19. Sulfur Derivatives of the Fatty Acids.

E. *Synthesis.* 20. In Vitro Synthesis of Fatty Acids. 21. Biosynthesis.

F. *Isolation and Identification.* 22. Separation. 23. Identification of Individual Fatty Acids.

*Author and Subject Indexes.*


The NLGI SPOKESMAN
4638 J. C. Nichols Parkway
Kansas City 12, Missouri

Please send me/us the following:

____ copy (s) of *Bailey, Melting and Solidification of Fats* $9.00

____ copy (s) of *Markley, Fatty Acids* $13.50

Name (please print)

Street

City State

☐ Enclosed is a check

☐ Please bill me later

If you choose to fly here is the scene coming into San Francisco with the Golden Gate Bridge just below you.

# NLGI Annual Meeting

The NLGI Annual Meeting this year offers some wonderful opportunities to combine your trip with post-meeting trips. This is an opportunity that may never again be available to you. Another possibility is to make a family affair out of it.

Grapevine information has it that there will be entertainment and trips in San Francisco for the ladies. After the meeting at the Mark Hopkins, October 25-27, will be your chance of a lifetime to take your family to the many interesting places on the Pacific Coast—possibly farther west to Hawaii. Actually, once you are in San Francisco an additional trip to an interesting and restful spot isn't too expensive.

### *Side Trips by Train*

As an example, one post-meeting trip is scheduled to leave San Francisco at 9:00 p.m., October 27, arriving the next morning in Los Angeles at 9:00 a.m. On arrival there you will board a special motor bus for a tour of Los Angeles while your baggage will be sent directly to the Biltmore Hotel. Your tour that day will include a good part of the city, the San Fernando Valley and Toluca Lake where many movie stars have their homes. You will pass several movie studios and can visit Universal International Studios, which has huge sets, entire streets and villages, and other interesting properties. Your bus returns by way of the Hollywood Bowl to the Biltmore at 1:00 p.m. No further program is scheduled for that day.

Friday, October 29—the entire day is yours to go to the many beaches. Possibly a trip to the Farmers Market or Pasadena will fill out the day. That evening you will have a dinner dance party in the Biltmore Bowl which boasts one of the better floor shows in Southern California. This is included in the trip.

Saturday, October 30—No program today, but everyone should be in the hotel lobby by 3:00 p.m. to transfer by motor to the Union Station where you board the Santa Fe Chief for the homeward journey. You leave Los Angeles at 4:00 p.m., and arrive in Chicago, Monday, November 1, at 9:45 a.m. The cost of this return can be had for as little as $61.90.

You may decide to take the Los Angeles tour on your way home. Here is an interesting scene, Olvera Street in Los Angeles. It was the principal street of the first little pueblo to bear the city's name.

### *For Those Who Are Flying*

Many of the people attending this year will want to reach San Francisco by air. Here are some round trip rates from various cities:

## *Here Are Some Opportunities for You and Your Family to Enjoy a Post Meeting Vacation Trip*

| *To San Francisco* FROM | *Flying Time* | *First Class Fare* | *Aircoach Fare* |
|---|---|---|---|
| Buffalo | 10 hrs. 12 mins. | $273.10 | $196.00 |
| Cleveland | 8 hrs. 35 mins. | 254.20 | 180.00 |
| Kansas City | 5 hrs. | 193.50 | 150.00 |
| Minneapolis | 9 hrs. 45 mins. | 218.10 | ..... |
| New Orleans | 8 hrs. 46 mins. | 244.00 | 226.00 |
| Pittsburgh | 8 hrs. 45 mins. | 264.50 | 192.00 |
| Chicago | 6 hrs. 5 mins. | 218.10 | 152.00 |
| New York | 9 hrs. 20 mins. | 301.90 | 218.00 |
| Cincinnati | 8 hrs. 20 mins. | 244.10 | 174.00 |
| Indianapolis | 7 hrs. 22 mins. | 233.20 | ..... |
| Oklahoma City | 6 hrs. 42 mins. | 186.10 | ..... |
| St. Louis | 11 hrs. 30 mins. | 206.30 | 173.00 |

San Francisco is the gateway for a variety of interesting post-meeting trips and tours. Honolulu is only nine hours away with Aircoach fare $250.00. Portland, Seattle, and Tacoma are less than three hours flight. By Aircoach round trip is only $64.00.

### *Or—You Could Go to Honolulu*

The San Francisco meeting offers a splendid opportunity to visit Hawaii at reasonable cost This trip includes going there by air and returning by ship. You leave by air at 11:45 p. m., October 27 and arrive 7:30 a. m., October 28. After that you spend several glorious days visiting Hawaii, leaving by ship November 10, arriving back in San Francisco November 15 at 9:00 a.m.

While in Hawaii you will stay at the Royal Hawaiian Hotel, making trips from there to see the many points of interest the "orchid island" has to offer . . . active volcanoes . . . Hilo . . . Kau Desert . . . Mt. Tantalus . . . Waikiki Beach . . . beauties of Honolulu, with the All Day Circle Island Trip thrown in for good measure. Part of your sightseeing will be made by air to various points of interest.

Among the many entertaining return pleasures on board ship will be the captain entertaining you at a champagne party. Your ship carries an outdoor pool, movie theatre, night club, lounge for musicals and teas, library and many other diverting and interesting things such as various deck games. You will find your ship is air-conditioned throughout. This entire trip can be made for as little as $731.50.

If you are planning to make any of these, or other side trips after the NLGI Annual Meeting, it is urged you make reservations now. For further information, contact the NLGI office.

**You take a last look at a San Francisco beauty spot before leaving on the Hawaiian trip. This is looking north to the bay from one of the city's fourteen hills.**

**You went to Hawaii by plane. Here is the ship that will bring you back steaming past famous Diamond Head.**

**While in Hawaii you will see this—possibly try it yourself.**

# NLGI Associate and Technical Men

## CONTAINER AND CLOSURE MANUFACTURERS

**Bennett Industries, Inc.**
Peotone, Illinois
Representative—S. A. Bennett

**Central Can Company**
2415 West 19th St., Chicago 8, Illinois
Representative—Henry Frazin

**Continental Can Company, Inc.**
629 First National Bank Bldg., Omaha, Neb.
Representative—T. A. Graham

**Geuder, Paeschke & Frey Company**
324 North Fifteenth St., Milwaukee 1, Wis.
Representative—Neil Savee

**Inland Steel Container Company**
6532 South Menard Ave., Chicago 38, Ill.
Representative—John H. Strome

**Jones & Laughlin Steel Corporation**
Container Division
405 Lexington Ave., New York 17, N. Y.
Representative—Jerry Lyons

**National Steel Container Corp.**
6700 South LeClaire Ave., Chicago 38, Ill.
Representative—Henry Rudy

**The Ohio Corrugating Company**
917 Roanoke Ave. S. E., Warren, Ohio
Representative—Lawrence F. McKay

**Rheem Manufacturing Company**
570 Lexington Ave., New York 22, New York
Representative—F. J. Blume

**Rieke Metal Products Corporation**
Auburn, Indiana
Representative—Ralph S. Pearson

**Trilla Cooperage, Inc.**
2524 Blue Island Ave., Chicago 8, Ill.
Representative—Lester Trilla

**United States Steel Products**
Division, United States Steel Company
30 Rockefeller Plaza, New York 20, N. Y.
Representative—Wm. I. Hanrahan

**Vulcan Stamping & Mfg. Co.**
P. O. Box 367, Bellwood, Illinois
Representative—H. B. Scharbach

## MANUFACTURERS OF EQUIPMENT FOR APPLICATION OF LUBRICATING GREASES

**Aro Equipment Corporation**
Bryan, Ohio
Representative—R. W. Morrison

**Balcrank, Inc.**
Disney near Marburg, Cincinnati 9, Ohio
Representative—Richard P. Field

**Gray Company, Inc.**
60 Northeast 11th Ave., Minneapolis 13, Minn.
Representative—B. A. Beaver

**Lincoln Engineering Company**
5701 Natural Bridge Ave., St. Louis 20, Mo.
Representative—G. A. Hubbard

**Stewart-Warner Corporation**
Alemite Division
1826 Diversey Parkway, Chicago 14, Illinois
Representative—D. C. Peterson

**United States Air Compressor Co.**
5300 Harvard Ave., Cleveland 5, Ohio
Representative—C. A. Bening

## MARKETING ORGANIZATIONS

**California Texas Oil Company, Ltd.**
551 Fifth Ave., New York 17, New York
Representative—Hal U. Fisher

**Canadian Petrofina Limited**
1015 Beaver Hall Hill
Montreal, Quebec, Canada
Representative—M. E. Wight

## REFINERS

**Farmers Union Central Exch., Inc.**
P. O. Box G, St. Paul 1, Minnesota
Representative—H. F. Wagner

**Mid-Continent Petroleum Corp.**
Mid-Continent Bldg., P. O. Box 381, Tulsa, Okla.
Representative—J. W. Basore

**Valvoline Oil Company**
Division of Ashland Oil & Refining Co. Box G
Freedom, Pennsylvania
Representative—D. A. Smith

## SUPPLIERS OF EQUIPMENT FOR MANUFACTURING LUBRICATING GREASES

**Blaw-Knox Company**
Buflovak Equipment Division
1543 Fillmore Ave., Buffalo 11, New York
Representative—Edward V. Hegg

**Chemicolloid Laboratories, Inc.**
30 Church St., New York 7, New York
Representative—David F. O'Keefe

**The Girdler Company**
A Div. of National Cylinder Gas Co. Box 987
Louisville 1, Kentucky
Representative—J. E. Slaughter, Jr.

**Manton Gaulin Mfg. Co., Inc.**
44 Garden Street
Everett 49, Massachusetts
Representative—G. W. Eldridge

**Morehouse Industries**
707 Henry Grady Building, Atlanta 3, Georgia
Representative—George E. Missbach

**The C. W. Nofsinger Company**
906 Grand Ave., Kansas City 6, Missouri
Representative—C. W. Nofsinger

**Stratford Engineering Corporation**
1414 Dierks Bldg., Kansas City 6, Missouri
Representative—J. W. Sylvester

## SUPPLIERS OF MATERIALS FOR MANUFACTURING LUBRICATING GREASES

**Acme-Hardesty Company**
60 East 42nd St., New York 17, New York

**Archer-Daniels-Midland Company**
Chemical Products Division, 2191 W. 110th St.
Cleveland 2, Ohio
Representative—Frank C. Haas

**Armour & Co., Chemical Division**
1355 West 31st St., Chicago 9, Illinois
Representative—H. F. Whitler

**Attapulgus Minerals & Chemicals Corporation**
210 W. Washington Sq., Philadelphia 5, Penn.
Representative—R. H. Hubbell, Jr.

**The Baker Castor Oil Company**
120 Broadway, New York 5, New York
Representative—H. H. Fritts

**Darling & Company**
4201 South Ashland Ave., Chicago 9, Illinois
Representative—G. W. Trainor

**E. I. du Pont de Nemours & Co.**
Wilmington, Delaware
Representative—John R. Sabina

**The Elco Lubricant Corporation**
Jennings Road & Denison Avenue
Cleveland 9, Ohio
Representative—Frank X. Sieloff

**Emery Industries, Inc.**
4300 Carew Tower, Cincinnati 8, Ohio
Representative—R. F. Brown

**Enjay Company, Inc.**
15 West 51st St., New York 19, New York
Representative—Sidney W. Fay

**Foote Mineral Company**
18 W. Chelten Ave., Philadelphia 44, Penn.
Representative—James Fentress

**General Mills, Inc.**
Chemical Division, 400 Second Ave. South
Minneapolis 1, Minnesota
Representative—Abner C. Hopkins, Jr.

**A. Gross and Company**
295 Madison Avenue, New York 17, N. Y.
Representative—Eugene W. Adams

**W. C. Hardesty Company, Inc.**
P. O. Drawer 110, Dover, Ohio
Representative—W. G. McLeod

**Harshaw Chemical Company**
1945 East 97th Street, Cleveland 6, Ohio
Representative—W. J. Straka

**Leffingwell Chemical Company**
P. O. Box 191, Whittier, California
Representative—D. E. Murphy

# ...bers...

*Supporting Your Organization These Suppliers to this Industry and Marketers of its Products Hold Membership in NLGI*

**Lithium Corporation of America, Inc.**
Rand Tower, Minneapolis 2, Minnesota
Representative—Walter M. Fenton

**The Lubrizol Corporation**
Box 3057—Euclid Station, Cleveland 17, Ohio
Representative—John H. Baird

**Mallinckrodt Chemical Works**
2nd & Mallinckrodt Sts., St. Louis 7, Missouri
Representative—C. E. Cosby

**N. I. Malmstrom & Company**
147 Lombardy St., Brooklyn 22, New York
Representative—Ivar Wm. Malmstrom

**Metasap Chemical Corporation**
Harrison, New Jersey
Representative—O. E. Lohrke

**Monsanto Chemical Company**
1700 Second Street, St. Louis 4, Missouri
Representative—J. W. Newcombe

**National Lead Company**
Baroid Sales Div., 111 Broadway, N. Y. 5, N. Y.
Representative—H. H. Farnham

**National Rosin Oil Products, Inc.**
1270 Ave. of the Americas, N. Y. City 20, N. Y.
Representative—Richard Bender

**Newridge Chemical Company**
600 North Wells Street, Chicago 10, Illinois
Representative—T. E. Shine

**M. W. Parsons—Plymouth, Inc.**
59 Beekman St., New York City 38, New York
Representative—Herbert Bye

**Synthetic Products Company**
1636 Wayside Rd., Cleveland 12, Ohio
Representative—Garry B. Curtiss

**Swift & Company**
165th & Indianapolis Blvd., Hammond, Ind.
Representative—F. H. Beneker

**Vegetable Oil Products Co., Inc.**
Vopcolene Division
5568 East 61st Street, Los Angeles 22, Calif.
Representative—C. F. Williams

**Warwick Chemical Company**
Division Sun Chemical Corp., 10-10 44th Ave.
Long Island City 1, New York
Representative—Dr. J. J. Whitfield

**Witco Chemical Company**
75 East Wacker Drive, Chicago 1, Illinois
Representative—E. F. Wagner

## TECHNICAL AND RESEARCH ORGANIZATIONS

**Institut Francais du Petrole**
CMrR—Courtel, 4 Place Bir Hackeim
Rueil—Malmaison (S. et Oise) France

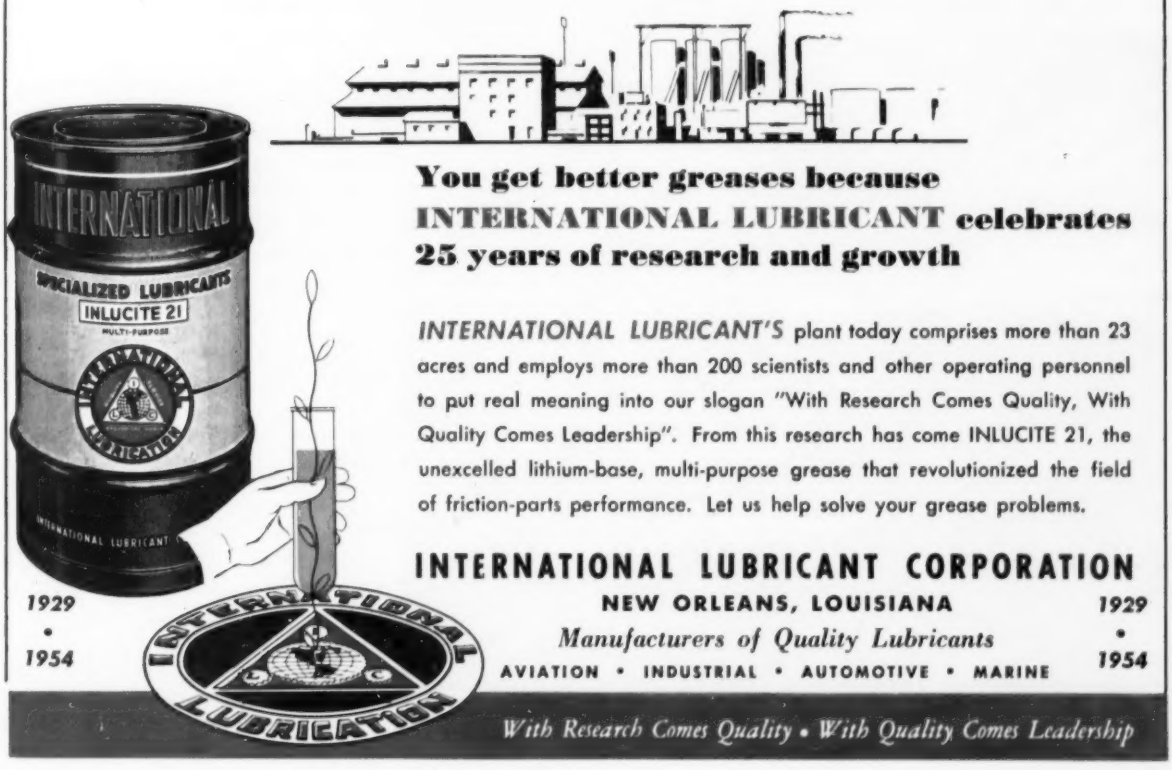
**Les Laboratoires de Recherches Purfina**
31 rue de la Loi, Bruxelles, Belgium
Representative—R. Gillerot

**Midwest Research Institute**
4049 Pennsylvania, Kansas City 2, Missouri
Representative—Dr. M. H. Thornton

**Petroleum Educational Institute**
9020 Melrose Avenue, Los Angeles 46, Calif.
Representative—G. A. Zamboni

**Phoenix Chemical Laboratory, Inc.**
3953 W. Shakespeare Ave., Chicago 47, Ill.
Representative—Mrs. G. A. Krawetz

**Sociedad Nacional de Petroleos**
Rua D. Pedro V, no. 80, Lisbon, Portugal
Representative—Manuel Corda Boullosa


**You get better greases because INTERNATIONAL LUBRICANT celebrates 25 years of research and growth**

*INTERNATIONAL LUBRICANT'S* plant today comprises more than 23 acres and employs more than 200 scientists and other operating personnel to put real meaning into our slogan "With Research Comes Quality, With Quality Comes Leadership". From this research has come INLUCITE 21, the unexcelled lithium-base, multi-purpose grease that revolutionized the field of friction-parts performance. Let us help solve your grease problems.

**INTERNATIONAL LUBRICANT CORPORATION**
**NEW ORLEANS, LOUISIANA**
*Manufacturers of Quality Lubricants*
AVIATION • INDUSTRIAL • AUTOMOTIVE • MARINE

1929 • 1954

1929 • 1954

*With Research Comes Quality • With Quality Comes Leadership*

# PEOPLE in the Industry

## Loughney Elected Vice President of Canadian Gulf

Mr. E. D. Loughney has been elected a Vice-President of the Canadian Gulf Oil Company.

Mr. Loughney, who has been general manager of the Canadian Gulf Oil Company with headquarters at Calgary since 1951, will continue to be responsible for the company's expanding oil exploration and production operations in Canada. According to published reports of Gulf Oil, the Company held some 6.4 million acres of undeveloped leases and options in Western Canada and had 195 producing wells in Alberta at the end of 1952.

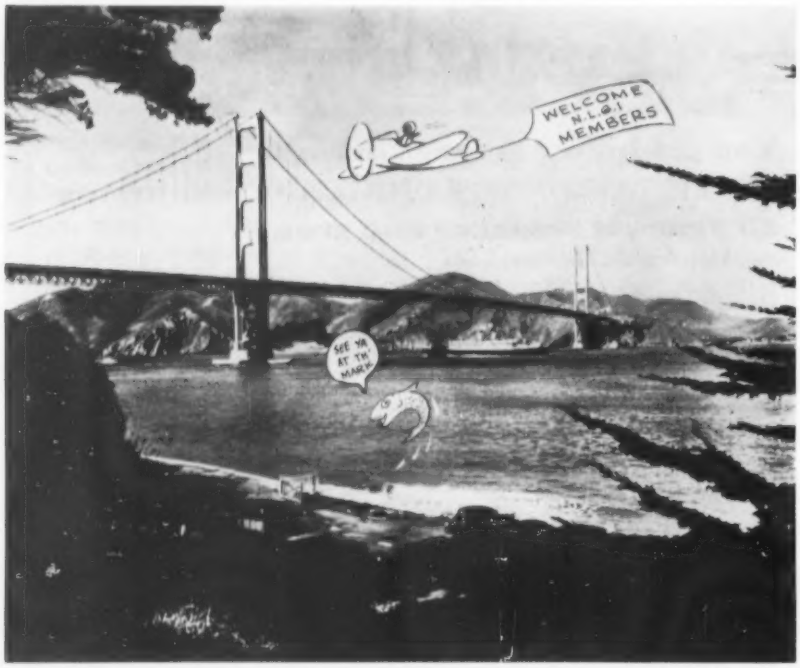
A veteran of 26 years with the Gulf Companies, Mr. Loughney began his service as an employee in the purchasing warehouse department in Seminole, Oklahoma. Subsequently, he was transferred to the accounting department of the company's Tulsa production division, being appointed assistant divisional auditor in 1940 and divisional auditor in 1947. In recognition of his broad knowledge of oil production operations and oil company administration, he was selected to manage the Canadian Gulf Oil Company's operations when these were expanded two and a half years ago.

## Zweifel Rewarded

Henry C. "Pat" Zweifel, Inglewood, California, supervisor of lubricating products development at Richfield Oil Corporation's refinery at Watson, had a $5,000 check and congratulations from his boss and fellow employees recently because he made, not a better mousetrap, but a better sealer and lubricant for pipe joints.

Zweifel received the $5,000 from Richfield and was honored at a luncheon at the refinery for his development of a threadseal lubricant, patent rights on which have been assigned to Richfield.

Used on the threads of drill and line pipe connections, Zweifel's product was found to have superior lubricating quality under extremes of high and low temperature and high pressure conditions, inhibits rust and corrosion, forms a firm seal against leakage and does not "freeze" or cause sticking of pipe joints.




**When you attend the NLGI Annual Meeting (October 25-27), you'll see the Golden Gate Bridge . . . world's largest single span. Have you made your reservations for you and your party at the Mark Hopkins in San Francisco?**

**Richard F. Spain**

T. A. Printon, President of Nopco Chemical Company, has announced the recent appointment of Richard F. Spain as Mid-West District Sales Manager.

A company employee since 1941, Mr. Spain is well acquainted with many of the technical problems in this area through his work as a chemist in Nopco's Control and Sales Service Laboratories and, for the past eight years, as an outstanding member of the sales force in Illinois and Iowa.

Mr. Spain is active in the Chicago Paint, Varnish and Lacquer Association; Chicago Drug and Chemical Association; Chicago Perfumery, Soap and Extract Association; and the Lake States Section of TAPPI.

## H. A. Mayor, Sr. Recovering

H. A. Mayor, Sr., President of Southwest Grease and Oil of Wichita, Kansas, recently was struck with an attack of acute Hepatitis. We are happy to report that the worst of the illness is behind him. He is now expected to make definite progress toward complete recovery.

He will be in the hospital through most of April and then go directly home for another month of recuperation. His doctor believes it may be possible for him to return to his desk by June first, but this is the earliest to be expected.

This news comes as a distinct shock to his many friends in this industry and we are happy to report here that his progress has been satisfactory to date.

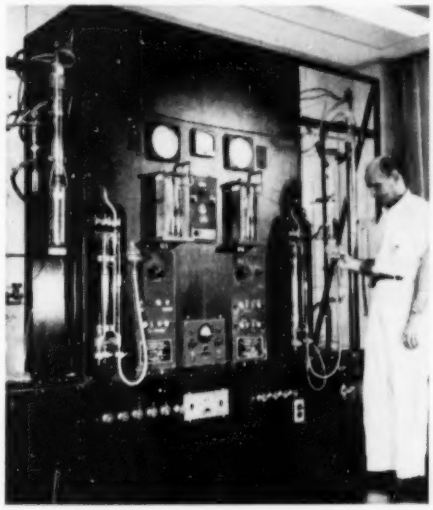
# General Mills Aliphats Increase Grease Yields ☆☆☆☆☆ Offer Uniform Performance ☆☆☆☆☆ Reduce Production Time

**Production time** operates in your favor when you make lubricating greases with fatty acids. More and more manufacturers report they save time and money on grease production by using General Mills Aliphats (fatty acids).

Why? Because of fast "kettle turnover." Fatty acids react faster than whole fats. This means greater productivity of existing plant, equipment and personnel.

Currently, the trend among manufacturers of lubricating greases is toward purer raw materials. That's why many grease makers . . . formerly satisfied with whole fat tallows . . . are now using General Mills Aliphats—singly or in combination. These manufacturers appreciate General Mills' ability to make fatty acids of the quality they want.

Grease makers can no longer stand the expense of improperly balanced fat compositions. Instead, they are turning to modern fatty acid technology to get special acid mixtures tailor-made for specific needs.



**General Mills chemist separating and analyzing fatty acids in the laboratory with a high temperature fractional distillation column.**

There's a best way for you to get the fat compositions you need, too. Make your selections from a variety of specialized Aliphats, fatty acids that are made carefully all the way from choice of tallows to final processing. For additional information on General Mills fatty acids, please mail the coupon below.

☆☆☆☆☆

**Aliphat (Fatty Acid)** 26-C, for example, is one of the General Mills fatty acids designed to meet your grease making needs. Aliphat 26-C contains all of the component fatty acids that occur in the natural tallow. Its light color and uniform composition make it of special interest to manufacturers of lime greases.

Also, the relatively high stearic acid content of Aliphat 26-C compared to mixed animal greases, for instance, results in a higher yield of calcium grease. It makes lubricating greases with higher oxygen stability, reducing tendency to gum, because of low concentration of poly-unsaturated acids. The almost instantaneous and complete saponification of Aliphat 26-C offers you an easy way to reduce operating and equipment costs.

In addition to Aliphat 26-C, General Mills has several fatty acids of interest to grease makers. If you wish technical data on General Mills Aliphats for grease making, just mail the coupon below.

☆☆☆☆☆

**Remember,** besides faster production time, fatty acids can also increase your grease yields, add greater uniformity of performance, and give you improved stability.

Fatty acids just don't react in the hit-or-miss manner so common to whole fat tallows. The fatty acids react faster and more completely. They contain approximately five percent more reactive materials than whole fats. They also conform more precisely to your production requirements—allowing special modifications.

If you do not have technical information on the fatty acids available from General Mills, please mail the coupon below.

*There is an* ALIPHAT *for your specific need.*

☆☆☆☆☆

## General Mills

CHEMICAL DIVISION

KANKAKEE, ILLINOIS

Please send me technical information on General Mills Aliphats (fatty acids).

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

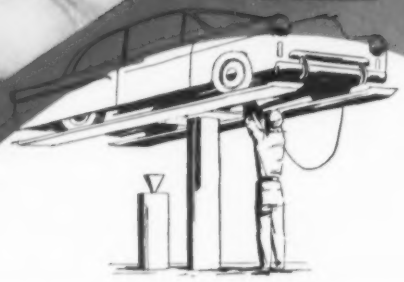
*progress thru research*

# A LOGICAL ANSWER FOR BETTER GREASES...

## BETTER TALLOW FATTY ACIDS

*Specify*

## "DISTAL 42"



Producers of lubricating greases are turning to high-quality, uniform "DISTAL 42". This distilled fatty acid is light in color, free of moisture, glycerine and protein. An extremely low linoleic acid content, the absence of triglycerides, and a low ester number make DISTAL 42 ideal for lubricating greases as well as hand cleaners, soaps, and chemical specialties.

**CHECK THESE SPECIFICATIONS**

| | |
|---|---|
| Titre | 40 to 43°C |
| Acid Number | 200 to 205 |
| Iodine Value | 40 to 60 |
| Saponification Value | 201 to 206 |
| Color (5¼" Lovibond) | Max. 40Y/4.0R |

*Available in drums or aluminum tank cars for immediate shipment. Samples and prices are available on request.*

**WRITE FOR FREE WALL CHART OF ADM "CHEMI-FATS."**
Easy-to-read tables give composition and specifications of 40 ADM Chemicals from Oils and Fats. (Chart is 17"x 27")

Hydrofol

**ACIDS • GLYCERIDES • SPERM OILS • ALCOHOLS**
*FROM VEGETABLE • ANIMAL • MARINE OILS and FATS*

PRODUCED IN ANY QUANTITY

SAMPLES TO SHIPLOADS

**Other ADM Products:**
Linseed Oil, Soybean Oil, Fish Oil, Paint Vehicles, Vinyl Plasticizers, Foundry Binders, Industrial Cereals, Vegetable Proteins, Wheat Flour, Dehydrated Alfalfa Meal, Livestock and Poultry Feeds

**ARCHER • DANIELS • MIDLAND COMPANY**
*Chemical Products Division • 2191 West 110th St. • Cleveland 2, Ohio*

C. R. "Chuck" Wheeler

## Wheeler Joins Southwest Grease and Oil

Southwest Grease and Oil Co., Inc. of Wichita, Kansas, announces the employment of C. R. "Chuck" Wheeler as Western sales representative to operate within a territory including all states west of the Rocky Mountains.

Mr. Wheeler came to Southwest Grease and Oil from Penn Grade Crude Oil Association where he served as a field representative.

## Wogisch to Chairman Packaging Committee

Henry M. Wogisch, purchasing agent of L. Sonneborn Sons, Inc., has been elected chairman of the Petroleum Committee of The Packaging Institute, Inc. He succeeds A. Douglas Murphy of Esso Standard Oil Company. Mr. Wogisch has been active in The Packaging Institute for years and has been a member, practically since its inception, of the Subcommittee on Metal Drums and Pails.

## W. M. Raynor Takes New Position at Foote

Foote Mineral Company, Philadelphia, recently announced that William M. Raynor has been assigned the job as assistant to L. G. Bliss, the vice president in charge of sales. Raynor who has been with Foote since June of 1942 will, in addition to his new responsibilities, continue as manager of special product sales.

## Morehouse Executives to Attend Japanese Industrial Fair

Expanding free Asia industry represents a large potential market for American industrial machinery in the opinion of Norman W. F. Klein, director of exports of Morehouse Industries, Los Angeles equipment manufacturing firm. Klein and Jolly Joe Taylor, consulting chemical engineer for Morehouse, are leaving in April for an extended tour of plants using Morehouse machinery in Japan, the Philippine Islands, Formosa, and Hong Kong.

Immediate plans call for the two Los Angeles executives to visit Osaka, Japan, where they will supervise the Morehouse exhibit which has been organized by their Japanese representatives in the Osaka Machinery Industrial Fair.

## Huggins Transferred To Pittsburgh

Gulf Oil Corporation has transferred Vice-President R. P. Huggins to its general offices in Pittsburgh where he will direct the crude oil purchases and products supply operations of the company. The newly formed department, which combines the activities of products supply and distribution, formerly under the direction of the domestic marketing department, and crude oil purchasing, will be known as the crude oil and products supply department.

Mr. Huggins, a veteran of 33 years with the Gulf Companies, has been located at Houston, Texas, as Vice-President in charge of crude oil purchases since 1952. He previously was a Vice-President of the Western Gulf Oil Company, a production subsidiary on the west coast.

Assisting Mr. Huggins, as manager of products supply and distribution, will be Mr. R. O. Jennings.

## Rheem Promotes Horne

Rheem Manufacturing Co. has promoted Carlos H. Horne from northern California regional manager to assistant general manager of the company's western division. He will assist division manager E. C. Bergen on all phases of Rheem merchandising and manufacturing activities on the West Coast.

Horne, a graduate of Georgia Tech and a former vice-president of Alabama Gas Corp. in Birmingham, joined Rheem in 1951 as manager of white goods and major appliances. He will continue to make his headquarters at the Rheem western division offices in Richmond near San Francisco.

Carlos H. Horne

**Produces more uniform product at lower cost**

● Check these advantages gained by Shell Oil Company in its continuous processing of lithium hydroxystearate grease with VOTATOR® Grease Making Apparatus:

**Higher production rate,**
**Lower labor costs.**
**Lower soap costs.**
**Eliminates fire hazard.**
**Makes consistency uniform.**
**Saves floor space.**

Find out how *you* can benefit with Votator Grease Making Apparatus. Write The Girdler Company, Votator Division, Louisville 1, Kentucky.

*VOTATOR—Trade Mark Reg. U. S. Pat. Off.

the GIRDLER Company
A DIVISION OF NATIONAL CYLINDER GAS COMPANY
VOTATOR DIVISION

# Industry NEWS

## Jennings Speaks on Economic Aspects of Middle East Aid

"Coming events in the Middle East will have a very great influence on the relative positions of the states in the Russian orbit versus the Free World," B. Brewster Jennings, president of Socony-Vacuum Oil Company, Inc., stated recently. He was speaking on "Economic Aspects of Middle East Oil" before the Third Eastern Regional Conference of the National Federation of Financial Analysts Societies, sponsored by the New York Society of Security Analysts, Inc.

"The Middle East is important beyond any possibility of exaggeration," Mr. Jennings said. "According to oil geologists and engineers," he declared, "half to two thirds of the world's oil reserves lie in the Middle East, principally in Iraq, Iran, Kuwait, Saudi Arabia and Qatar. Even now these countries produce about 20 per cent of the Free World's oil, and we hope, and I personally feel there is good reason to expect, that history will some day show that we are now engaged in a development which will prove of incalculable benefit to the Middle East countries and to the other free nations of the world.

"Prior to the discovery of oil, the Middle East countries had relatively simple and modest economies with very little internal commerce, practically no industrial development and an insignificant international trade. Their oil revenues are very large in relation to their total revenues prior to the development of the oil industry. It seems reasonable to expect that within another decade or two the economies of these nations will be completely transformed. This coming change is having its effect politically in that these countries are becoming increasingly conscious of their sovereignty and they do not propose to be imposed upon."

Middle East oil is essential to the Orient, Mr. Jennings pointed out, and will soon almost completely displace western hemisphere oil in the Western European market because the Western Hemisphere needs more and more of its own oil, and because of currency and exchange problems.

The third great area of oil consumption is the Western Hemisphere, the speaker said. Discussing the movement of Middle East oil into the United States, Mr. Jennings said: "We must recognize that any great international movement of commodities can only be in response to a set of economic conditions which make such movement profitable to those engaged in it. This means, of course, that

the thing being imported must be available at its source at a price low enough so that when the cost of transportation is added the laid down cost will be less than the cost of locally available material.

"While the very large flowing wells of the Middle East reduce the so-called lifting cost, there are many other costs peculiar to the Middle East which makes the total relatively high. Operators must p r o v i d e virtually everything required by human beings to live. Practically all the governments obtain some 50 per cent of the over-all profit. Costs are high enough so that taking oil at the points of loading at the posted price, profits realized by Middle East operators are no higher per barrel than are those normally expected in Venezuela, the United States or Canada."

Even with temporarily low freight rates, the importer's margin is slight because Middle East crudes are generally of lower quality than that from the Western Hemisphere, the speaker said.

If all the tankers not now employed were put in the Persian Gulf-North Atlantic seaboard trade, Mr. Jennings stated, they could move only about 175,000 barrels per day, as compared to current average imports from all sources of about 650,000 barrels of crude and roughly 400,000 barrels daily of residual fuel oil. Even this small crude increase could not be effected, he pointed out, until and unless additional refineries on the Atlantic seaboard were equipped with the specialized processing facilities needed to run Middle East crudes.

Explaining that Middle East pipe lines have no economic effect on world markets, Mr. Jennings said that Tapline, which runs from the Persian Gulf to Lebanon, cost over $200,000,000 instead of the expected $125,000,000, and that it will provide a very long pay-out against even normal tanker freights and is unattractive when related to the present very low rates.

"The present trend toward larger and therefore more economic tankers," he said, "coupled with the fact that there is little hope that pipe lines will be built any more cheaply in the future than they have been in the past, leads me to believe that pipe lines to the Mediterranean will only be built to connect fields so situated that an almost equally long line would have to be built to reach the Persian Gulf."

In a brief reference to Iran, Mr. Jennings said:

"Personally, I expect that when and if Iranian production does come back, it will be readily absorbed because growth in demand for oil from the Middle East is likely to be at least equal to any output which can be rehabilitated and reestablished out of the Iranian fields."

## U. S. Steel Receives Award

The United States Steel Corporation has been selected to receive the George Washington Medal from the Freedoms Foundation at Valley Forge, for its UNITED STATES STEEL HOUR telecast, "P.O.W." A sensitive drama of the effects of "brain-washing" on GI's in Korean prisoner-of-war camps, "P.O.W." was the premiere telecast of the new STEEL HOUR series which began last October.

Announcement of the award was made at Washington's birthday ceremonies on the site of Valley Forge. The medal is in recognition of "outstanding achievement in helping to bring about a better understanding of the American way of life during 1953."

## Alemite Announces New Lubrication Equipment

The general upswing of farm mechanization received considerable attention in a nation-wide survey conducted by Alemite, a division of Stewart-Warner Corporation, and the results were a determining factor in designing types of lubrication equipment best suited for farm applications. The current farm labor shortage and the subsequent time factor faced by America's farmers were also part of the survey, Gus Treffeisen, distribution sales manager announced.

As a direct result of the survey Alemite offers a completely new lubrication gun and loader combination which has been designed to meet the farmers' needs.

The lever type hand gun, Model 4026-A is air pocket proof, and is filled through a loader fitting directly from a loader which fits the original container, and is sealed against dust, dirt and grit. Delivery of 150% more per stroke than ordinary lever guns is claimed and pressures up to 4,000 pounds are possible. The gun has a capacity of 16 ounces.

Among other features claimed for the gun is a longer extension that makes it easy to reach "hard to get at" fittings. The new type head and lever linkage is of rugged design and is built to withstand the roughest treatment.

The loader, Model 7133, fits over the lip of a standard 25-pound container (a small adapter makes it ready for use with a 35-pound pail.)

The loader fitting on the gun opens and closes the valve on the loader to further prevent waste and contamination, Treffeisen said. An automatic shut-off valve forestalls over-loading of the gun and direct "center-line" operation prevents the container from tipping or tilting while the gun is being loaded.

The loader builds ample pressure to handle normally used farm lubricants, even in cold weather. Shock absorber springs are installed at both top and bottom of the loader tube to prevent damage and to provide for easier operation.

**Alemite's New Lubrication Gun**

The inside of the original container is wiped clean of lubricant by a new, non-tilting follower plate as the level of the lubricant decreases. Due to its design, the follower plate completely empties each container.

Delivery of this new merchandise is now being made to the nation-wide Alemite distributing organization and to farm equipment and implement dealers, Treffeisen said.

## API Motor Oil Service Classification Popular

Recognition of the recently-adopted API service classification for crankcase motor oils has spread to distant nations, the Lubrication Committee of the American Petroleum Institute's Division of Marketing was told at the Detroit meeting in February.

R. Cubicciotti, L. Sonneborn Sons, Inc., New York, 1954 Lubrication Committee chairman, announced at the concluding session that interest in the API motor oil service classification has been expressed by official and industry organizations in Germany and South Africa.

The API designations "ML," "MM" and "MS," basing motor oil changes on the severity of driving conditions, are being used increasingly in this country, the committee reported.

The three-day winter meeting set two attendance records for the Lubrication Committee in Detroit. Three hundred persons attended one day's sessions and 230 heard Dr. Neal Bowman, National Association of Manufacturers, who spoke at the dinner meeting on "Changes and Challenges."

In a paper on preignition, W. E. Bettoney, Petroleum Chemicals Division, E. I. duPont de Nemours & Co., Wilmington, Del., said preignition is likely to become an important factor in the operation of the more efficient high compression automobile engines of the future.

"One of the factors impeding progress to higher compression engines," said Bettoney, "is the fact that residues or deposits from the fuel and oil accumulate in the combustion chamber of engines and increase the tendency for knock. Furthermore, such deposits may glow and ignite the gases in the cylinder before it is ignited by the spark plug. This effect is known as preignition."

Bettoney said preignition might be overcome by changes in engine operating conditions, by increased fuel octane quality and by the use of fuels and oils which do not contribute to harmful types of combustion chamber deposits.

Vincent Ayres, assistant chief engineer of the Valve Division, Eaton Manufacturing Co., Detroit, discussed valves, valve lifters and other components which "make or break" an engine valve system.

CASE HISTORY

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After much hair-pulling and many dollars later, they found that improved Emery 531 Animal Fatty Acid corrected their difficulties and restored quality to acceptable standards. In fact, the performance of the Emery fatty acid was better than they had ever experienced and even eliminated some of their production and quality difficulties to which they had become inured.

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## American Oil Chemists Society to Hold Short Course

"Inedible Fats and Fatty Acids" is the subject of the Sixth Short Course to be sponsored by the American Oil Chemists' Society. The course will be held at Lehigh University, Bethlehem, Pennsylvania, August 15-20, 1954. Topics to be included are economic and technological trends, recovery and handling of inedible fats and fatty acids, chemical reactions, technology and applications of inedible glycerides, and production and applications of fatty acids and derivatives. The final program will be announced in the May or June issue of the Journal of the American Oil Chemists' Society.

The registration fee for the course is $50; room and board, $35 (Sunday evening to Friday noon). Registration forms can be obtained from the Society's office, 35 E. Wacker Drive, Chicago 1, Illinois. Advance registration is required; early registration is is recommended since the course is limited to 200.

Information regarding the Short Course may be obtained from the Society's office, 35 E. Wacker Drive or from the Chairman of the Short Course Subcommittee, Dr. Daniel Swern, Eastern Regional Research Laboratory, United States Department of Agriculture, Philadelphia 18, Pennsylvania.

## API Marketing Meeting To Be in Denver

New York—The important steps that jobbers and distributors should take now to protect and preserve their estates and businesses will be discussed in detail at the mid-year meeting of the Division of Marketing of the American Petroleum Institute in May.

This was announced by Robert M. Bartlett, vice-president of Gulf Oil Corp., Pittsburgh, Pa., and API vice-president for the Division of Marketing.

The program for the meeting, which will be held in Denver, May 17-18-19, is being prepared by the division's program committee headed by J. G. Jordan, vice-president of Shell Oil Co., New York. He said:

"From the way things are shaping up now, the Denver meeting is going to be the finest we've ever had. In addition to the discussion on estates and businesses, we're going to have a well-rounded program that will interest men engaged in all phases of petroleum marketing. Details on the balance of the program will be announced as they are completed.

Henry M. Tibbetts, assistant vice-president of the Harris Trust and Savings Bank, Chicago, will make the prepared talk on estate plans for jobbers and distributors. Although it is meant primarily for jobbers, other marketers are bound to have an interest in this discussion.

## Balcrank Appoints New Distributor

Balcrank, Inc., Cincinnati, Ohio, announces the appointment of Autoquip Corporation, Inc., Chicago, Illinois, as distributor of their line of lubricating equipment in the Chicago area.

In addition to sales Autoquip will handle service and installation of Balcrank lubrication equipment.


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**This model is called a "Three-Dimensional Blueprint" by engineers and field construction workers now building one of the largest catalytic crackers in the world at Shell Oil Company's refinery at Norco, Louisiana. It has a total feed of 72,000 barrels per day. This model, eight feet long, four feet wide and three feet four inches high, is on an exact scale of ¼ inch to one foot. H. H. Wenderman, builder of the model, points out some of its features to H. E. Henslee (left), of Foster Wheeler Corporation, builders of the unit, and H. L. Isham, Shell engineer.**

## Roensch Speaks at API Lubrication Committee Meeting

The future of the new gas turbine, now in the experimental stage in the automotive industry, must be regarded "with an open mind and with a degree of optimism."

This conclusion was reached by Max M. Roensch, director of laboratory tests, Chevrolet Engineering Department, Detroit, in a paper entitled "Automotive Power—Gas Turbines or Piston Engines?" which he presented at the winter meeting of the Lubrication Committee of the American Petroleum Institute.

Because of high fuel consumption at idle and light loads, Roensch cautioned that extensive development work on the turbine will be needed to enable it to compete favorably with automotive piston engine.

For example, he said that at idle a 235-horsepower gas turbine would use 8 to 10 gallons of fuel per hour as compared to 0.7 to 1 gallon per hour for the piston engine.

"Since the gas turbine would only be competitive with a piston engine in applications where the engine is operating at full load the majority of the time," Roensch continued, "it would seem that the first commercial service of this engine would be in the bus and truck field."

"Many basic advantages certainly justify thorough investigation and development," he said. "However, the gas turbine must give better performance than the reciprocating engine and its efficiency must be improved to be acceptable."

Roensch said the first gas turbine automobile was built by the Rover Company in England, and was put through preliminary trial runs in 1950. In 1952 a Rover turbine-powered car established an average top-speed record of 151.2 miles per hour. In 1950, Boeing installed one of its 175 bhp turbines in a Kenilworth truck at Seattle Washington. Roensch said this installation provided the necessary road evaluation of the potentialities of the turbine in a heavy-duty truck, and proved that the turbine would give acceptable performance on the road.

General Motors placed its gas turbine-powered automobile. "The Firebird" on display in New York in January, 1954. This car was powered by an experimental gas turbine developed in the Research Laboratories Division of General Motors.

Roensch pointed out that the gas turbine, in the form of the turbo-jet engine for use in aircraft, has completely revolutionized both the power plant and the airplane. Nevertheless, he said piston engines equipped with exhaust turbines will continue to provide power in the air transport field for many years at speeds up to 450 mph, "due to their better over-all efficiency."

In railroad locomotive and marine fields, the gas turbine "will have to outperform the efficient and proven diesel engine in order to receive serious consideration." Union Pacific, he said, has 10 gas turbine locomotives in operation and has placed an order for 15 more. During this same period, the railroad ordered 205 diesel locomotives. Use of gas turbine locomotives is limited to the hauling of trains requiring full power.

For electric power generation, Roensch asserted the gas turbine is "excellent" for stand-by or peak-load service in operation where units of 5,000 to 15,000 kw. can be economically justified and where the operating time is short.

"To succeed," he concluded, "the gas turbine must meet the performance and efficiency not only of present day engines but of engines of the future.

Expansion plans for a nation-wide network of 35 automotive service training schools were described in a talk by Paul E. McDonald, manager of the General Motors Training Centers, Detroit.

He said the training centers were being developed because the technical complexity of the automobile had increased to such an extent that not even the old timers among mechanics could "play it by ear." Only the Detroit Training Center currently is in operation, but 10 more are under construction and 23 will be completed by the end of 1954.

McDonald asserted the public schools could no longer provide trained mechanics and the task is "too complex" to handle entirely through training on the job. Dealers, he said, are unable to do the training job themselves, so the assignment falls on the motor car manufacturer.

R. Cubicciotti, L. Sonneborn Sons, Inc., New York, presided.

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## API Appoints Membership Committee

The appointment of a 21-man Membership Committee has been announced by R. M. Bartlett, vice president for the Division of Marketing of the American Petroleum Institute.

The Membership Committee was authorized by the Division last November to explore ways and means of interesting more marketing people in API activities.

B. L. Majewski, president of The Great American Oil Co., Chicago, was named chairman. Other members are: Stanton K. Smith, Vice Chairman, Smith Oil and Refining Company, Rockford, Ill.; Robert O. Anderson, Malco Refining Company, Roswell, N. M.; W. C. Burns, Hartol Petroleum Corporation, New York, N. Y.; Wiley Butler, Coastal Oil Company, Newark, N. J.; Royal E. Decker, Plymouth Oil Company, Detroit, Mich.; B. E. Devere, Pathfinder Petroleum Corporation, Los Angeles, Calif.; R. L. Kent, Kent Oil Company, Salina, Kan.; Edward Ketcham, Anderson - Prichard Oil Corp., Oklahoma City, Okla.; J. David Sterling, Sunset Oil Company, Los Angeles, Calif.; Everett F. Wells, Ashland Oil & Refining Company, Ashland, Kentucky.

## British Company Publishes Lubricant Testing Book

Practical experience of lubricant testing over twenty-five years has proved that the method books of standardizing bodies, invaluable as they are, are not in themselves sufficient guide for the oil and grease chemist. This is particularly true in the case of smaller firms where the chemist's duties combine those of routine testing with lubricant development and the investigation of complaints.

A new book, "Lubricant Testing", by F. G. Ellis, B. Sc., F. Inst. Pet., fills this gap. In addition it will be of great help to beginners in all oil laboratories, chemists in various industries whose primary concern is with products other than lubricants, and non-chemical personnel such as engineers and salesmen who wish to acquire some insight into the significance and application of the tests used in the standardization and investigation of oils and greases.

The tests considered have been grouped under three main headings: fundamental properties such as density, viscosity, etc.; composition; investigation of behavior which includes functional testing. The method of presentation and very numerous illustrations make this work invaluable to both young and fully experienced chemists, sales personnel, and anyone who is, or who may be, concerned with lubrication problems.

The correct methods of testing lubricants are vitally important to ensure that they will continue to play an ever increasing part in reducing energy wasted in friction. The author's long experience on this work is here set down for the benefit of all oil chemists and works chemists who are responsible for manufacturing, testing, and supplying lubricants, or for executives who are interested in their economical application.

SPOKESMAN readers may order this book from Scientific Publications (Great Britain) Ltd., 8, Walker Street, Wellington, Shropshire, England. The price is $6.00.

## Gulf Building At Port Arthur

A new ethylene plant and a new platforming plant will be erected at the Port Arthur, Texas, refinery of Gulf Oil Corporation, the company has announced.

The ethylene unit, the second such to be built at the refinery, will have capacity of 3,000,000,000 cu. ft. of ethylene gas per year. It will more than double the refinery's present production, raising the total to nearly 5,500,000,000 cu. ft. yearly.

The platforming unit is designed to produce an improved quality of high octane motor gasoline. The unit may also be used to expand aviation gasoline production. Capacity will be 29,000 barrels per stream day.

The platforming process will utilize platinum as a catalyst to convert lower octane gasolines and naphthas, produced in the refinery, into high test gasoline of superior quality.

Construction of both units is scheduled to begin this spring and to be finished in the first quarter of 1955. Each will occupy about two acres at the refinery with substantially more land provided for the added auxiliary equipment attendant to them. Although not related functionally, they have in common the fact that neither will require an increase in the crude charged to the refinery.

The ethylene unit will use, as its charge stock, propane and other gases produced in refining. These will be pre-processed in compression and treating units for removing impurities. The main plant will comprise a series of fractionating towers for separating ethylene, ethane and other hydrocarbons, and a series of cracking furnaces for converting the propane and ethane to ethylene.

The unit is designed to be self sufficient, including a power plant for steam and electricity, water cooling tower and circulating system, sewers, fire prevention apparatus and pipelines. Extensive instrumentation will permit a large degree of operation from a central control room.

The new ethylene facilities were planned to supply the rapidly expanding chemical industry of the Gulf coast, which uses this gas in such diverse products as ethyl alcohol, polyethylene, plastics, synthetic rubber, anti-freeze and anti-knock compounds, emulsifying agents, artificial silk, acetic acid, and chemical intermediates.

The unit will employ the platinum catalyst method developed by the Universal Oil Products Company. The plant comprises a catalytic reactor and a fractionation section to separate the product of the reactor into various desired products. Auxiliary installations will be a water cooling tower, steam generator, sewers, tanks, and yard pipelines.

All the gasoline will be marketed within the Pennsylvania oil region, embracing Western Pennsylvania and New York, Southeastern Ohio and West Virginia.

Illustrations how a company can use these methods are offered in the form of charts and tables. A bibliography of articles and books for the manufacturer who wants to pursue further the subject of distribution research completes the booklet.

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## Attapulgus and Edgar Brothers Plan Merger

Announcement has been made by Wright W. Gary, president, Attapulgus Minerals & Chemicals Corporation, and James Deshler, president, Edgar Brothers Company, that a basis of merger of the two companies has been agreed upon, subject to ratification by directors and stockholders. The merged company would be known as American Minerals & Chemicals Corp.

Attapulgus is a large producer of fullers earth used widely in the chemical, petroleum and other industries. Mines and processing plant are located in Georgia. It also owns patented processes for the concentration of mineral ores, particularly phosphate and potash, which it licenses to others. A sudsidiary, Porocel Corporation, produces activated bauxite at Berger, Arkansas. Research laboratories are maintained at Lakeland, Florida, and Camden, New Jersey.

Edgar Brothers is the oldest and one of the largest integrated producers of kaolin, a basic raw material used in the production of high-grade papers, wallpapers and paperboard. Edgar aluminum silicate pigments are being used in increasing quantities in paints, adhesives, printing inks, plastics and other important industrial specialties. The company owns kaolin deposits, operates two mines, five processing plants, and research laboratories in Georgia. Executive offices are located in Metuchen, N. J.

Gary will be president of the new company and Deshler will be chairman. David E. Lilienthal, now chairman of Attapulgus, will become chairman of the executive committee and the research policy committee; Alfred G. Blake will be executive vice president; R. H. Hubbell, Jr., vice president; Charles W. Nielson, treasurer; W. E. Sawyer, Jr., secretary.

The Attapulgus and Edgar Brothers businesses will retain their identities and will be operated as separate divisions of American Minerals & Chemicals Corporation. By combining the research activities of the two organizations it is believed that new mineral and chemical products, not now produced by either Attapulgus or Edgar Brothers, can be developed and marketed.

## Mallinckrodt to Expand

Mallinckrodt Chemical Works, a chemical manufacturing company with headquarters in St. Louis, Missouri, filed March 1 with the Securities and Exchange Commission in Washington a registration statement covering 75,000 shares of its Class A common stock. This proposed issue is the company's first public offering of stock since its founding 86 years ago. The proposed issue is to be underwritten and distributed by a group of St. Louis investment bankers headed by Newhard, Cook & Company.

The proceeds of this issue will be used to add to the company's capital investment in increased and improved facilities for manufacture and research, chiefly at its St. Louis plant, continuing a program of expansion that was undertaken immediately following the war and which has included a 75% expansion of laboratory space.

Mallinckrodt Chemical Works was founded by three brothers, Gustav, Edward and Otto Mallinckrodt, in St. Louis, Missouri, in 1867, and was incorporated in 1882, with Edward Mallinckrodt serving as President or as Chairman of the Board from that time until 1928. In that year, he was succeded as Chairman of the Board by his son, Edward Mallinckrodt, Jr., who occupies that position today.

The company is one of the leading manufacturers in this country of chemicals for use by medicinal, pharmaceutical, industrial, graphic arts and institutional customers (including other chemical companies). Under contract with the Atomic Energy Commission, the company is also engaged in the processing of uranium-containing materials into uranium

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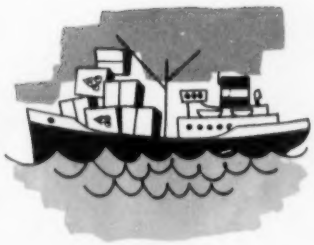

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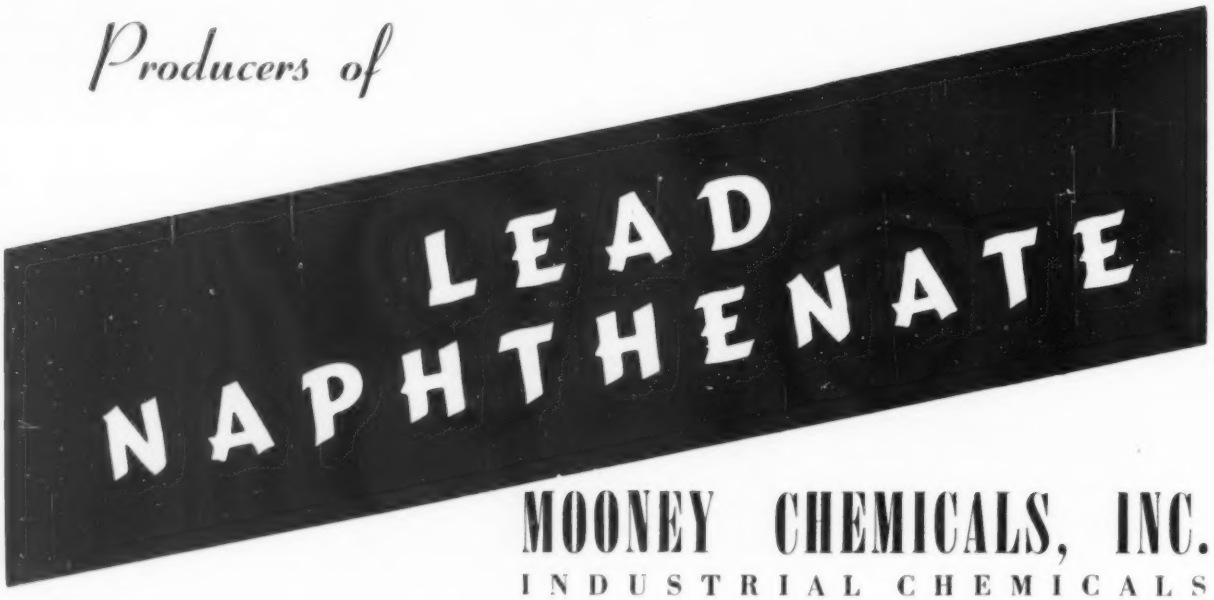


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In addition to Mr. Edward Mallinckrodt, Jr., the directors of the company are: Charlton MacVeagh, Vice Chairman and Treasurer, Joseph Fistere, President, H. V. Farr, John R. Ruhoff, V. H. Wallingford, A. H. Homeyer, all executive officials of the corporation; and John M. Meyer, Jr., Vice President of J. P. Morgan and Co., Incorporated; and David R. Calhoun, Jr., President, St. Louis Union Trust Company.


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## Agriculture Featured In Du Pont Series

During the past 20 years, while world population has increased 25 per cent, world food production has inched up a scant five per cent. Yet in the United States, with an 18 per cent increase in population in the same period, food production has leaped ahead by 50 per cent.

The story of how modern technology – science and the farmer teamed together – has accomplished this American agricultural miracle is told in a fascinating picture-filled booklet, "The Story of Agricultural Chemicals," which is being distributed today by the Du Pont Company. It is the latest in the "This Is Du Pont" series.

While every American has the output of 7.4 acres of land each year to fill his food requirements, a Japanese, for instance, has the fruits of less than a quarter-acre, the book points out. Still more important, a veritable revolution in farming methods, stemming from new farm machines modern organic chemicals which lay low the farmer's traditional enemies in nature, and improved varieties of plants and breeds of livestock, has made those American acres pay off in a steady, dependable stream.

As American farmers adapt new scientific developments to their operations, a new-found freedom is also being felt throughout rural areas, the booklet shows. Better working conditions, higher living standards, and more leisure for farm workers and owners alike are changing the appearance of both farm homes and country towns.

"The massive thrust of technology, not social protest," it is sown, "has brought to the American farm its vast productivity and fruitfulness." Where, in colonial times, 85 per cent of the population were farmers, food producers today represent only about 12 per cent of our population. Advances in the science and techniques of agriculture have freed larger segments of the population to use their skill in other fields.

## Witco Chemical Opening Plant on Pacific Coast

First Pacific coast plant of Witco Chemical Co., which has headquarters in New York, is being opened in Los Angeles.

The plant comprises four modern factory buildings on three fenced acres, with open and covered storage facilities, and railroad siding.

## Willetts Heads Committee

Herbert Willetts, of Socony-Vacuum Oil Co., New York, has been named chairman of a new meeting assistance committee established by the Division of Marketing of the American Petroleum Institute.

The objective of the new committee is to assist, upon request, in obtaining talent for programs of jobber, dealer and other association meetings attended by oil marketing people anywhere in the country.

In announcing the appointments, R. M. Bartlett, vice president of Gulf Oil Corp., and API vice president for Marketing, pointed out that "All members of the Division's General Committee, together with many other prominent oil marketers, have now been appointed to one of the standing operating committees of the Division."

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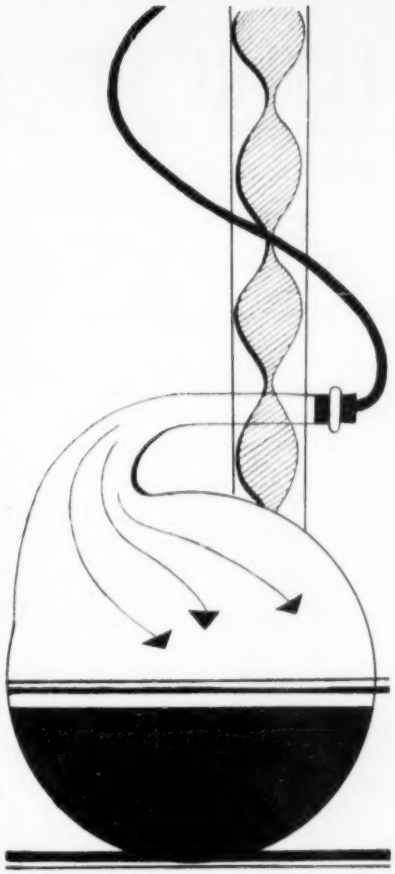

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# FUTURE MEETINGS of the Industry

**APRIL, 1954**

12-15 Society of Automotive Engineers (national aeronautical meeting, aircraft engineering display, and aircraft production forum), Hotel Statler, New York, N. Y.

14-16 National Petroleum Assn. (51st semi-annual meeting), Cleveland Hotel, Cleveland, Ohio.

22-23 Georgia Independent Oilmen's Assn. (Dempsey Hotel), Macon, Ga.

**MAY, 1954**

2-4 Independent Petroleum Assn. of America (midyear meeting), Cosmopolitan Hotel, Denver, Colo.

3-4 Oil Industry TBA Groups Midwest Section (Sheraton Hotel), Chicago, Ill.

3-5 American Petroleum Institute (Lubrication Committee), Skytop Lodge, Skytop, Pa.

3-7 American Petroleum Institute (safety & fire protection committees, midyear meeting), Chase-Park Plaza, St. Louis, Mo.

6-7 American Petroleum Institute (division of production, Pacific Coast district), Statler Hotel, Los Angeles, Calif.

6-8 National Tank Truck Carriers (6th annual convention), Netherland Plaza, Cincinnati, Ohio.

9-11 Empire State Petroleum Assn., Roosevelt Hotel, New York, N. Y.

10-12 American Petroleum Institute (Division of Transportation, Products Pipe Line Conference), Warwick Hotel, Philadelphia, Pa.

10-13 American Petroleum Institute (Division of Refining, Midyear Meeting), Rice Hotel Houston, Texas.

13-15 Interstate Oil Compact Commission (General Oglethorpe Hotel), Savannah, Ga.

16-19 American Inst. of Chemical Engineers, Springfield, Mass.

17-19 American Petroleum Institute (Division of Marketing, Midyear Meeting), Cosmopolitan Hotel, Denver, Colo.

17-21 National Fire Protection Assn. (58th annual meeting), Cosmopolitan Hotel, Denver, Colo.

20-21 National Industrial Conference Board (38th annual meeting), Waldorf-Astoria, New York, N. Y.

20-21 Kentucky Oil & Gas Assn., Lafayette Hotel, Lexington, Ky.

23-28 North Carolina Oil Jobbers Assn. (spring convention), cruise from Norfolk to Bermuda.

24-25 Packaging Institute (petroleum packaging committee), Cleveland, Ohio.

27-28 Western Petroleum Refiners Assn., Broadview Hotel, Wichita, Kan.

31-June 5 American Petroleum Institute (division of production, midyear committee conference), San Francisco, Calif.

**JUNE, 1954**

3-4 Pennsylvania Grade Crude Oil Assn., William Penn Hotel, Pittsburgh, Pa.

6-11 Society of Automotive Engineers (summer meeting), The Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

9-11 Oil Industry Information Committee, Edgewater Beach Hotel, Chicago, Ill.

13-18 American Society for Testing Materials (annual meeting and exhibits), Sherman Hotel, Chicago, Ill.

17-19 American Petroleum Institute (Division of Production, Eastern District), Greenbrier Hotel, White Sulphur Springs, W. Va.

21-25 American Inst. of Electrical Engineers (combined summer and Pacific general meeting), San Francisco, Calif.

24-25 Western Petroleum Refiners Assn. (regional meeting), Leonard Refineries Auditorium, Alma, Mich.

27-July 1 Petroleum Equipment Suppliers Assn., Manoir Richelieu, Quebec, Canada.

**AUGUST, 1954**

16-18 Society of Automotive Engineers (national West Coast meeting), Los Angeles, Calif.

**SEPTEMBER, 1954**

8-10 Oil Industry Information Committee, Conrad Hilton Hotel, Chicago, Ill.

12-14 Empire State Petroleum Assn., Hotel Syracuse, Syracuse, N.Y.

12-16 Society of Automotive Engineers (national tractor meeting), Schroeder Hotel, Milwaukee, Wis.

12-16 American Inst. of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.

12-17 American Chemical Society, New York, N. Y.

13-14 Packaging Institute (petroleum packaging committee), Philadelphia, Pa.

15-17 National Petroleum Assn. (52nd annual meeting), Traymore Hotel, Atlantic City, N. J.

16-17 Mid-Continent Oil and Gas Assn. (annual meeting), Roosevelt Hotel, New Orleans, La.

22-23 Ohio Petroleum Marketers Association (fall conference and golf tournament), Hollenden Hotel and Westwood Country Club, Cleveland, Ohio.

23-24 Western Petroleum Refiners Assn. (regional meeting), Henning Hotel, Casper, Wyo.

26-28 Pennsylvania Petroleum Assn., Inc., Pocono Manor Inn, Pocono Manor, Penna.

27-28 Independent Oil Compounders Association (7th annual meeting), Sheraton Hotel, Chicago, Illinois.

**OCTOBER, 1954**

4-6 Texas Mid-Continent Oil and Gas Assn. (annual meeting), San Antonio, Texas.

4-9 Society of Automotive Engineers (national aeronautic meeting), aircraft engineering display, and aircraft production forum, Hotel Statler, Los Angeles, Calif.

10-12 National Assn. of Oil Equipment Jobbers (4th annual meeting), Congress Hotel, Chicago, Ill.

Week of Oct. 18 Society of Automotive Engineers (national transportation meeting), Boston, Mass.

20-21 Nebraska Petroleum Marketers Assn. (annual convention), Paxton Hotel, Omaha, Neb.

21-22 Western Petroleum Refiners Assn. (Garrett Hotel), El Dorado, Ark.

23-25 National Association of Oil Equipment Jobbers (annual meeting), Hotel President, Kansas City, Mo.

25-26 Independent Petroleum Assn. of America (annual meeting), Tulsa, Okla.

25-26 Independent Petroleum Assn. of America (annual meeting), Shamrock Hotel, Houston, Texas.

25-27 NLGI ANNUAL MEETING, MARK HOPKINS HOTEL, SAN FRANCISCO, CALIF.

25-29 American Institute of Electrical Engineers (fall general meeting), Chicago, Ill.

26-27 Society of Automotive Engineers, national diesel engine meeting, Hotel Statler, Cleveland, Ohio.

**NOVEMBER, 1954**

4-5 Society of Automotive Engineers (national fuels and lubricants meeting), Mayo Hotel, Tulsa, Okla.

8-11 American Petroleum Institute (34th annual meeting), Conrad Hilton Hotel and Palmer House, Chicago, Ill.

28 to Dec. 3 American Socy. of Mechanical Engineers, Statler Hotel, New York, N. Y.

29-30 Packaging Institute (Petroleum Packaging Committee), New York, N. Y.

**DECEMBER, 1954**

2-7 National Exposition of Power and Mechanical Engineering, Commercial Museum, Philadelphia, Penna.

8-10 Oil Industry Information Committee, Waldorf-Astoria, New York, N. Y.

12-15 American Inst. of Chemical Engineers (annual meeting), Statler Hotel, New York, N. Y.

**JANUARY, 1955**

10-14 Society of Automotive Engineers (golden anniversary annual meeting), The Sheraton-Cadillac Hotel and Hotel Statler, Detroit, Michigan


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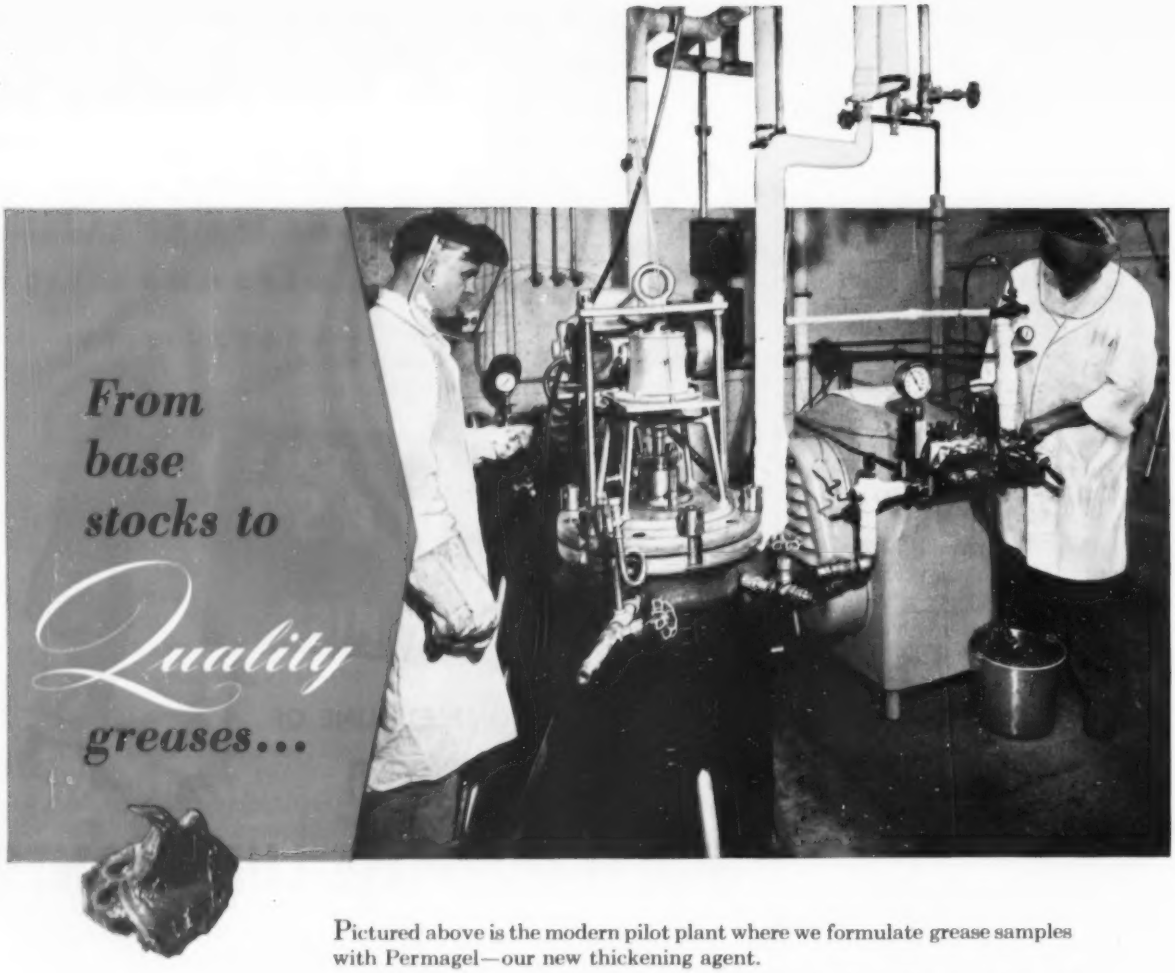


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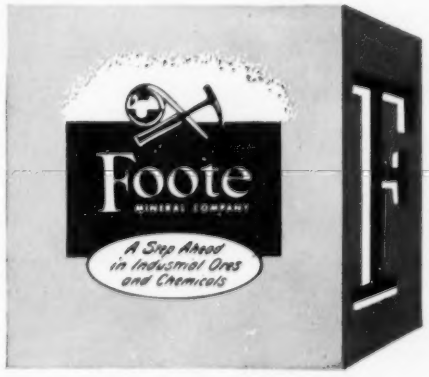


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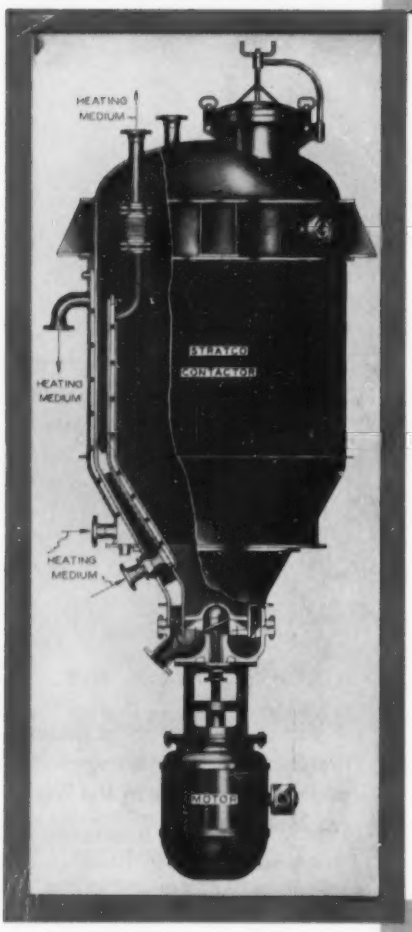


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